DIV. OF FISHES

COMMERCIAL FISHERIES Review

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COVER: The woman is a "gibber" in a Sitka, Alaska, processing plant. She extracts herring roe by hand. (BCF-Alaska photo: J. M. Olson)

See article page 45.

COMMERCIAL FISHERIES

Review

A comprehensive view of United States and foreign fishing industries--including catch, processing, marketing, research, and legislation--prepared by the Bureau of Commercial Fisheries.

Fishermen's Memorial
Gloucester, Mass.

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The Bureau of Commercial Fisheries and
The Bureau of Sport Fisheries and Wildlife
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Throughout this book, the initials BCF stand
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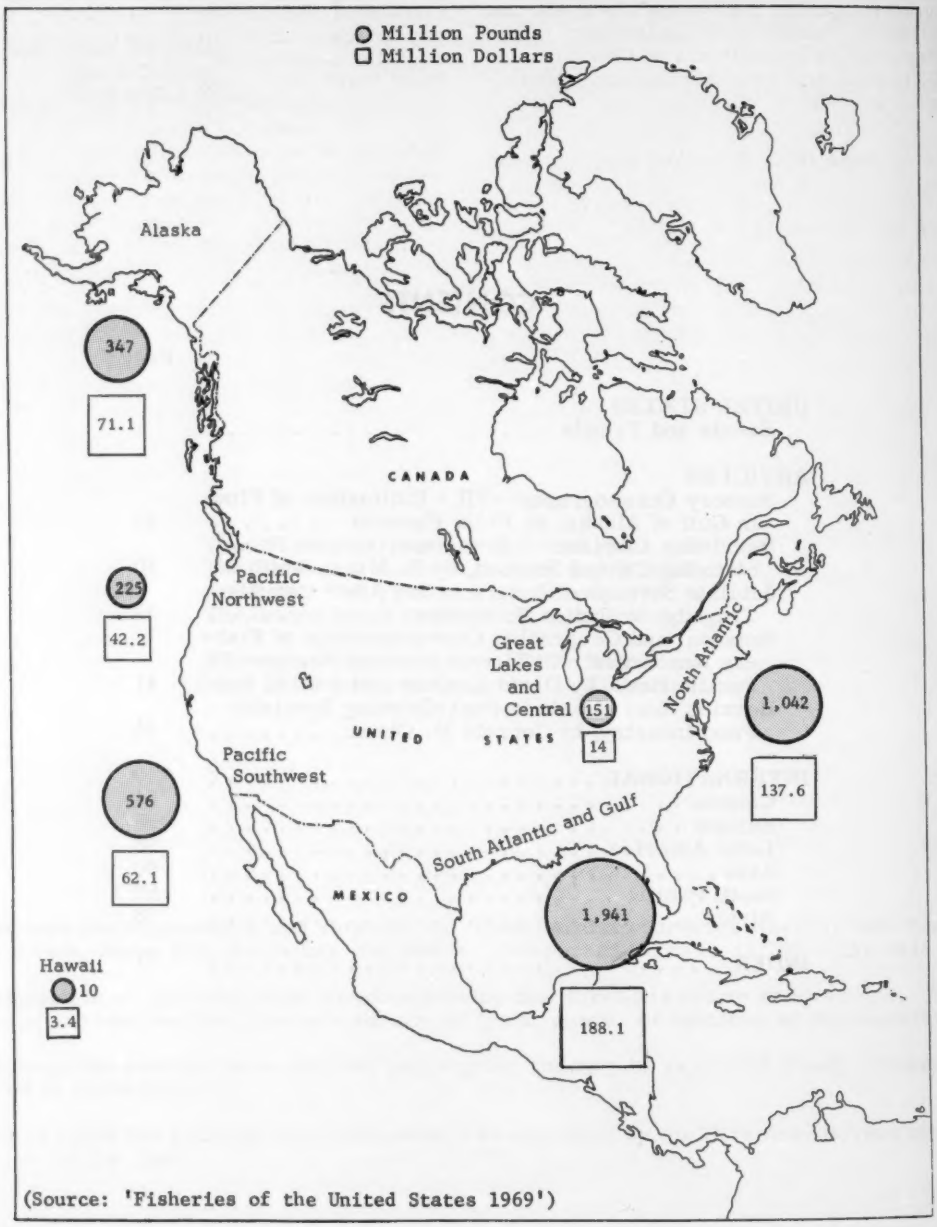
VOLUME & VALUE OF CATCH BY REGIONS, 1969



(Source: 'Fisheries of the United States 1969')

NIXON PROPOSES NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

President Nixon sent to Congress on July 9 a plan to reorganize the Nation's oceanic and atmospheric research organizations into a single part of the Department of Commerce--the National Oceanic and Atmospheric Administration (NOAA).

At the same time, the President proposed consolidation of 8 antipollution agencies into one independent organization--the Environmental Protection Agency (EPA).

Both plans will go into effect after 60 consecutive days of Congress in session--if neither house disapproves them by majority vote.

NOAA would have 12,000 employes and a $270-million budget. Manpower and funds would be transferred from several agencies. (See page 3.)

PRESIDENT NIXON'S MESSAGE ON NOAA

The oceans and the atmosphere are interacting parts of the total environmental system upon which we depend not only for the quality of our lives, but for life itself.

We face immediate and compelling needs for better protection of life and property from natural hazards, and for a better understanding of the total environment--an understanding which will enable us more effectively to monitor and predict its actions, and ultimately, perhaps to exercise some degree of control over them.

We also face a compelling need for exploration and development leading to the intelligent use of our marine resources. The global oceans, which constitute nearly three-fourths of the surface of our planet, are today the least-understood, the least-developed, and the least-protected part of our earth. Food from the oceans will increasingly be a key element in the world's fight against hunger. The mineral resources of the ocean beds and of the oceans themselves, are being increasingly tapped to meet the growing world demand. We must understand the nature of these resources, and assure their development without either contaminating the marine environment or upsetting its balance.

Establishment of the National Oceanic and Atmospheric Administration--NOAA--within the Department of Commerce would enable us to approach these tasks in a coordinated way. By employing a unified approach to the problems of the oceans and atmosphere, we can increase our knowledge and expand our opportunities not only in those areas, but in the third major component of our environment, the solid earth, as well.

Scattered through various Federal departments and agencies, we already have the scientific, technological and administrative resources to make an effective, unified approach possible. What we need is to bring them together. Establishment of NOAA would do so.

By far the largest of the components being merged would be the Commerce Department's Environmental Science Services Administration (ESSA), with some 10,000 employes (70 percent of NOAA's total personnel strength) and estimated Fiscal 1970 expenditures of almost $200 million. Placing NOAA within the Department of Commerce therefore entails the least dislocation, while also placing it within a Department which has traditionally been a center for service activities in the scientific and technological area.

These are the principal functions of the programs and agencies to be combined:

The Environmental Science Services Administration (ESSA) comprises the following components:

-- The Weather Bureau (weather, marine, river and flood forecasting and warning).

-- The Coast and Geodetic Survey (earth and marine description, mapping and charting).

-- The Environmental Data Service (storage and retrieval of environmental data).

-- The National Environmental Satellite Center (observation of the global environment from earth-orbiting satellites).

-- The ESSA Research Laboratories (research on physical environmental problems).

ESSA's activities include observing and predicting the state of the oceans, the state of the lower and upper atmosphere, and the size and shape of the earth. It maintains the nation's warning systems for such natural hazards as hurricanes, tornadoes, floods, earthquakes and seismic sea waves. It provides information for national defense, agriculture, transportation and industry.

ESSA monitors atmospheric, oceanic and geophysical phenomena on a global basis, through an unparalleled complex of air, ocean, earth and space facilities. It also prepares aeronautical and marine maps and charts.

Bureau of Commercial Fisheries and marine sport fish activities. Those fishery activities of the Department of the Interior's U.S. Fish and Wildlife Service which are ocean related and those which are directed toward commercial fishing would be transferred. The Fish and Wildlife Service's Bureau of Commercial Fisheries has the dual function of strengthening the fishing industry and promoting conservation of fishery stocks. It conducts research on important marine species and on fundamental oceanography, and operates a fleet of oceanographic vessels and a number of laboratories. Most of its activities would be transferred. From the Fish and Wildlife Service's Bureau of Sport Fisheries and Wildlife, the marine sport fishing program would be transferred. This involves five supporting laboratories and three ships engaged in activities to enhance marine sport fishing opportunities.

The Marine Minerals Technology Center is concerned with the development of marine mining technology.

Office of Sea Grant Programs. The Sea Grant Program was authorized in 1966 to permit the Federal Government to assist the academic and industrial communities in developing marine resources and technology. It aims at strengthening education and training of marine specialists, supporting applied research in the recovery and use of marine resources, and developing extension and advisory services. The Office carries out these objectives by making grants to selected academic institutions.

The U.S. Lake Survey has two primary missions. It prepares and publishes navigation charts of the Great Lakes and tributary waters and conducts research on a variety of hydraulic and hydrologic phenomena of the Great Lakes' waters. Its activities are very similar to those conducted along the Atlantic and Pacific coasts by ESSA's Coast and Geodetic Survey.

The National Oceanographic Data Center is responsible for the collection and dissemination of oceanographic data accumulated by all Federal agencies.

The National Oceanographic Instrumentation Center provides a central Federal service for the calibration and testing of oceanographic instruments.

The National Data Buoy Development Project was established to determine the feasibility of deploying a system of automatic ocean buoys to obtain oceanic and atmospheric data.

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA)

The following agencies will be brought into NOAA--which will be in the Department of Commerce--if Congress does not object to President Nixon's reorganization plan:

FROM DEPARTMENT OF THE INTERIOR

1. Bureau of Commercial Fisheries (BCF)
2. Marine sport fish activities of Bureau of Sport Fisheries and Wildlife (BSFW)

   BCF and BSFW now make up The Fish and Wildlife Service.

3. Marine Minerals Technology Center of the Bureau of Mines

FROM DEPARTMENT OF DEFENSE

1. Great Lakes Survey of the Army Corps of Engineers
2. National Oceanographic Data Center of the Navy Department
3. National Oceanographic Instrumentation Center of the Navy Department

FROM DEPARTMENT OF TRANSPORTATION

Data buoy development activities of the Coast Guard

FROM NATIONAL SCIENCE FOUNDATION

The program of grants to academic institutions for research in marine resources and technology.

ALREADY IN COMMERCE DEPARTMENT

The ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION (ESSA) remains in Commerce Department--but is shifted to NOAA.

Role of NOAA

Drawing these activities together into a single agency would make possible a balanced Federal program to improve our understanding of the resources of the sea, and permit their development and use while guarding against the sort of thoughtless exploitation that in the past laid waste to so many of our precious natural assets. It would make possible a consolidated program for achieving a more comprehensive understanding of oceanic and atmospheric phenomena, which so greatly affect our lives and activities. It would facilitate the cooperation between public and private interests that can best serve the interests of all.

I expect that NOAA would exercise leadership in developing a national oceanic and atmospheric program of research and development. It would coordinate its own scientific and technical resources with the technical and operational capabilities of other government agencies and private institutions. As important, NOAA would continue to provide those services to other agencies of government, industry and private individuals which have become essential to the efficient operation of our transportation systems, our agriculture and our national security. I expect it to maintain continuing and close liaison with the new Environmental Protection Agency and the Council on Environmental Quality as part of an effort to ensure that environmental questions are dealt with in their totality and that they benefit from the full range of the government's technical and human resources.

Authorities who have studied this matter, including the Commission on Marine Science, Engineering and Resources, strongly recommended the creation of a National Advisory Committee for the Oceans. I agree. Consequently, I will request, upon approval of the plan, that the Secretary of Commerce establish a National Advisory Committee for the Oceans and the Atmosphere to advise him on the progress of governmental and private programs in achieving the nation's oceanic and atmospheric objectives.

An On-Going Process

The reorganizations which I am here proposing afford both the Congress and the Executive Branch an opportunity to re-evaluate the adequacy of existing program authorities involved in these consolidations. As these two new organizations come into being, we may well find that supplementary legislation to perfect their authorities will be necessary. I look forward to working with the Congress on this task.

In formulating these reorganization plans, I have been greatly aided by the work of the President's Advisory Council on Executive Organization (the Ash Council), the Commission on Marine Science, Engineering and Resources (the Stratton Commission, appointed by President Johnson), my special task force on oceanography headed by Dr. James Wakelin, and by the information developed during both House and Senate hearings on proposed NOAA legislation.

Many of those who have advised me have proposed additional reorganizations, and it may well be that in the future I shall recommend further changes. For the present, however, I think the two reorganizations transmitted today represent a sound and significant beginning. I also think that in practical terms, in this sensitive and rapidly developing area, it is better to proceed a step at a time--and thus to be sure that we are not caught up in a form of organizational indigestion from trying to rearrange too much at once. As we see how these changes work out, we will gain a better understanding of what further changes--in addition to these--might be desirable.

Ultimately, our objective should be to insure that the nation's environmental and resource protection activities are so organized as to maximize both the effective coordination of all and the effective functioning of each.

The Congress, the Administration and the public all share a profound commitment to the rescue of our natural environment, and the preservation of the Earth as a place both habitable by and hospitable to man. With its acceptance of these reorganization plans, the Congress will help us fulfill the commitment.

BCF PROVIDES INFORMATION TO TROPICAL TUNA FLEET

Initial efforts toward extending BCF fishery advisory information to the tropical tuna fleet were completed during May, according to Dr. Michael Laurs, Group Leader, BCF La Jolla. Several San Diego-based purse seiners have sailed or are planning to sail to areas beyond the yellowfin regulatory area set up by the Inter-American Tropical Tuna Commission (IATTC). One group of 6 or 7 vessels plans to fish as far west as Truk and Palau.

For the most part, says BCF La Jolla, fishermen are unfamiliar with the oceanographic and fishing conditions they may expect to find outside the traditional fishing grounds in the eastern tropical Pacific. The American Tunaboat Association (ATA) asked BCF to provide information on oceanography, weather, and tuna resources that may help fishermen decide on areas most likely to have fish.

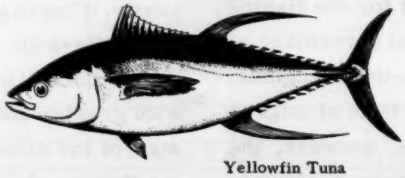
Dr. Laurs Prepares Synopsis

Dr. Laurs prepared a synopsis of what is known about tuna resources in the central and western tropical Pacific. It was based on records of exploratory cruises made mainly by BCF Hawaii and on Japanese catch data. "This information was included in a packet of data distributed to fishermen. The packet also included charts of sea-surface temperature, mixed layer depth, seabird and mammal sightings, information on weather, especially tropical storms, and sea conditions, and what weather advisory information is available over the marine radio bands for various regions in the central and western Pacific."

Also, arrangements were made with Tom Chase of Scripps Institution of Oceanography for BCF to print and distribute copies of unpublished bathymetric charts containing the most up-to-date and complete information.

Meet With Tunaboat Captains

On May 10, Dr. Laurs and R. Green of BCF and F. Miller of IATTC met with about 15 tunaboat captains and A. Felando of ATA to brief them and to present the information gathered. Also, Mr. Miller, under an IATTC contract with BCF, will provide special weather advisory information through ATA to the vessels as needed. XBT systems were installed and probes provided for two more vessels in the tropical tuna fleet. Each vessel has agreed to radio back synoptic BATHY reports and synoptic marine weather observations on a daily basis.



Yellowfin Tuna

ALBACORE TUNA CATCH OF 26-40 MILLION POUNDS PREDICTED

BCF La Jolla, Calif., estimates that 26 to 40 million pounds of albacore tuna will be landed in Oregon, Washington, and British Columbia this year. Between 11 and 15 million pounds will be landed in California. These estimates are based on current trends and historical analysis. "It would appear that the albacore fishery will be centered again this year in waters off the Pacific Northwest," says BCF La Jolla. This prediction is based on: warmer-than-average ocean temperatures in waters off the Pacific Northwest; position of 60° F isotherm offshore; and historical record of landings.

Albacore Prefer 60-66° F

The high correlation between the catch of albacore tuna and sea-surface temperature shows species seems to prefer temperatures in 60-66° F range. Historically, most albacore taken off California have been caught in waters 62-66° F; highest catches in 64° F.

Average sea-surface temperature in areas from which albacore were taken in July and August was about 62° F; for albacore caught in September, it was about 60° F. So reports Oregon State University. No commercial quantities of albacore were taken from waters off Pacific Northwest colder than 58° F, or warmer than 64.5° F.

Analysis of available information points strongly to an excellent start for the fishing season. A larger-than-normal percentage of the catch will be taken in northern regions. Present knowledge of arrival time of migrating population is inadequate; however, the probability of a northerly fishery suggest an early availability of fish in waters off Pacific Northwest.

1969 Landings

The Pacific west coast albacore landings in 1969 were 51 million pounds. This was somewhat higher than 1960-1968 average of 46 million pounds. The statistical variance in landings for 1960-1969 period is about 9 million pounds. According to 1960-1969 average, an estimation of 37-55 million pounds could be landed this year.

1970 Estimates

If Oregon, Washington, and British Columbia receive up to 75% of total west-coast landings, as in past 3 years, then California will receive 10-14 million pounds, and region to north 27 to 41 million pounds. If both regions receive 50% of total landings, then each will receive 18 to 28 million pounds. BCF La Jolla estimates 11 to 15 million pounds may be landed in California; 26-40 million pounds could be landed in Oregon, Washington, and British Columbia.

BCF La Jolla emphasizes that its projections of landings "are based on historical trends and our best estimates of the fishery. Without essential biological data for albacore we are in a difficult position to make meaningful long-term (seasonal) projections having the desired accuracy and substance." Recently, it began a study of albacore biology on a Pacific-wide basis. It hopes that in about a year this will provide "the ability to predict with greater confidence the abundance and size of the albacore population which enters the fishery along our coast each summer."

Fig. 1 - Relation of position of May 16-31, 1970, 60° F limiting isotherm to long-term average position for the same interval.

Fig. 2 - Average sea surface temperature fields for the July 1-15 interval. Shaded zone delineates region where most of the albacore would be available under these conditions.

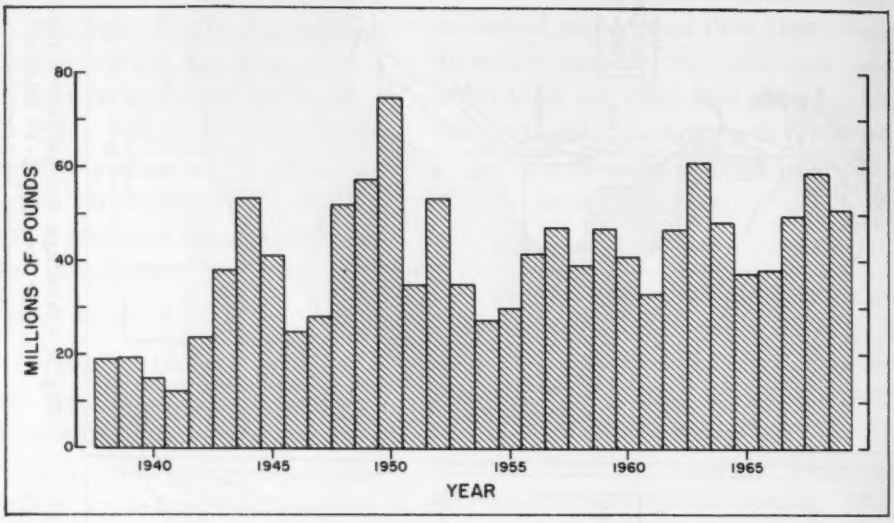


Fig. 3 - Total west coast (U.S. & Canada) landings of albacore tuna in millions of pounds, 1938-1969. Excluding 1938-1941, graph does not show significant trends in total landings. However, a decrease in year-to-year variability is evident in later years. Graph does not reveal effects of changes in fishing effort, availability, or fishing technology. In last few years, increase in effort and technology has not been matched by equivalent increase in catch.

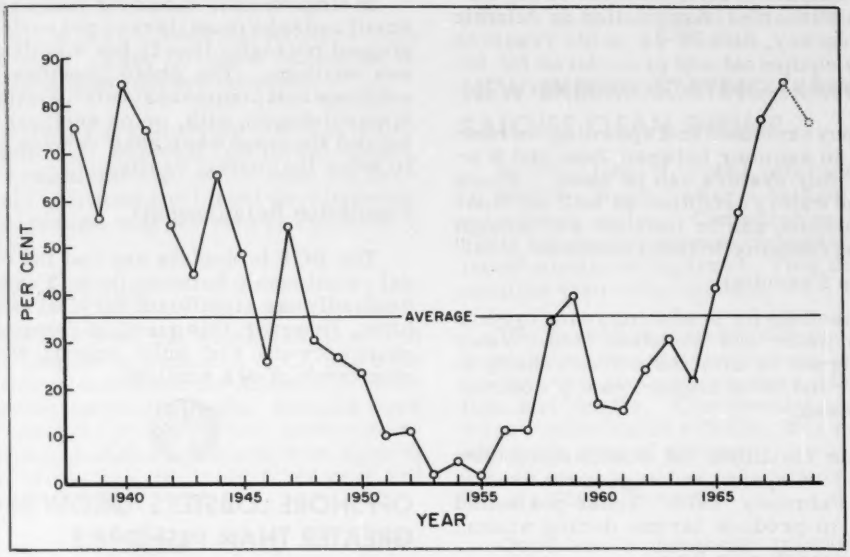
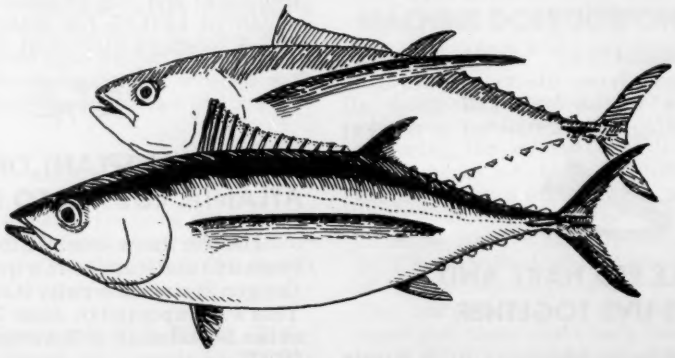


Fig. 4 - Percent of west coast albacore tuna catch taken north of San Francisco 1938-1969.



WINTER OYSTER SPAWNING TECHNIQUE DEVELOPED AT VIMS

Dr. John L. Dupuy of the Virginia Institute of Marine Science (VIMS) reported to the National Shellfisheries Association in Atlantic City, New Jersey, June 22-24, on his research to develop equipment and procedures for inducing oysters to spawn during winter.

Dr. Dupuy explained that spawning normally occurs in summer between June and September. "Any oysters can be used. Those in weak and watery condition as well as those in good condition can be fattened and brought to spawning condition within a month or less."

Production Essentials

The essentials for producing young oysters are warm water and abundant food. Water tanks designed to distribute food equally to each oyster and to be cleaned easily contribute to success.

Adequate facilities for conditioning oysters to produce sperm and eggs were used at VIMS in February 1970. These permitted scientists to produce larvae during winter.

Water Temperature's Role

Scientists believe that oysters spawned, carried through larval development, and raised through young-oyster stage under controlled conditions are ready to be placed on growing grounds when water temperatures are high enough for them to feed actively. In this way, they may reach market size 18 months earlier than under natural reproducing and growing conditions.

Some scientists believe it may be possible to use waste heat from electric generating plants. Oysters would feed and grow all winter--shortening time required to market them.

POST-JUVENILE RED HAKE AND SEA SCALLOPS LIVE TOGETHER

A photo taken by biologists of BCF Woods Hole (Mass.) laboratory aboard the 'Albatross IV' shows a 12-inch red hake snuggled against a sea scallop in its natural habitat on the sea bottom. The photo was taken at a water depth of 210 feet on Georges Bank, 125 miles east of Cape Cod, Mass.

First Evidence

Biologists have known for many years that small red hake (post-larvae and early juvenile stages) normally live in the mantle cavity of sea scallops. The photo provides the first evidence that commensal relationships (organisms living in, with, or on another) continue beyond the stage when hake become too large to enter the mantle cavity.

Population Relationship?

The BCF biologists say that the commensal relationship between these 2 species undoubtedly has significant survival value to the hake. However, this question remains: Does abundance of red hake depend directly on abundance of sea scallop?

OFFSHORE LOBSTERS' GROWTH RATE GREATER THAN INSHORE'S

The recapture of 5100 offshore lobsters tagged by scientists of BCF Boothbay Harbor (Maine) has provided much information on the increase in size at molting and the frequency of molting.

Offshore lobsters 60 to 80 millimeters in carapace length increase in length by 16% (females) and 19% (males) at molting--compared to 12-13% for inshore lobsters. Offshore lobsters also molt more frequently.

STUDY TRANSPLANT OF NORTHERN ATLANTIC LOBSTER TO PACIFIC

The Northern Atlantic lobster may be harvested in the Pacific Northwest, if studies by Oregon State University (OSU) are successful. This was reported in June Commercial Fisheries Newsletter of University of Rhode Island (URI).

Capt. James McCauley, lobster trawlerman and URI professor of fisheries, has shipped adult berried females and adult males

to OSU for study. These lobsters were trawled by 'Jerry and Jimmy' in offshore waters.

Offshore Lobsters for Oregon

Capt. McCauley believes that lobsters from offshore stock might be more adaptable to Oregon coast than inshore lobsters.

OSU workers are studying effect of water temperature on survival of larval stages. Oregon's relatively cold water does not provide ideal conditions for larval development. However, enough may survive to establish a population.

Canadian Experience

Dr. Ray Ghelardi, the Fisheries Research Board of Canada in Nanaimo, B.C., has been transplanting lobsters from Atlantic to British Columbia waters for years. Results were discouraging, but prospects now appear more encouraging. Lobsters hatched from eggs of Atlantic stock are in their third year and weigh over a pound.

DDT MAY INTERFERE WITH ADAPTABILITY OF TROUT

Scientists have become more concerned with once-unsuspected, subtle biological effects of environmental contaminants at sublethal levels. For example, water pollutants at legal levels were discovered by California researchers to cause dissipation of energy in flies and zooplankton--and interference with reproduction. This was reported in 'Science News' on May 9.

Canadian Trout Research

Two Canadian researchers discovered sublethal levels of DDT interfere with learning in brook trout. This may interfere with their adaptability.

Dr. J.M. Anderson and H.B. Prins, Fisheries Research Board of Canada in St. Andrews, N.B., exposed brook trout to 20 parts per million (ppm) of DDT for 24 hours. Then they subjected the fish to classical conditioning of the propeller-tail reflex.

A control group was conditioned in an average of 29 trials. Ten DDT-exposed fish could not be conditioned even after 100 trials; another 6 required an average of 76 trials.

NEW SHRIMP-SORTING TRAWL CATCHES CLEAN SHRIMP

BCF's 'John N. Cobb' returned recently to Seattle, Wash., after a shrimp-trawl development cruise. Comparative tows were made adjacent to commercial vessels with the latest model sorting trawl. This is about 25% smaller than other models.

The new trawl consistently caught 15-25% less shrimp than the commercial non-sorting trawls--but the catches were nearly free of fish and debris. Commercial catches often were contaminated with fish; this caused considerable loss of shrimp.

Cobb's Clean Shrimp

Once, the commercial trawler 'Jaka-B' caught 1,900 pounds of shrimp mixed with trash; the Cobb caught 1,500 pounds of clean shrimp. The Jaka-B Crew recovered only about 200 pounds of shrimp; all of Cobb's 1,500 pounds were high quality.

MACHINE DOES JOB ON MUSSEL THAT MUSCLE CAN'T DO CHEAPLY

A problem facing firms interested in developing a mussel industry is barnacles covering the mussel shell. These must be removed before sale. Removal by hand costs too much, so a mechanical method is needed.

Arne Einmo and Dr. Tim Joyner of the BCF Seattle Biological Laboratory ran a batch of mussels through an electric potato peeler. The barnacles were removed. The mussels emerged clean and ready for market. Operation time: about 55 seconds.

HATCHERIES ARE IMPROVING U. S. FISHING

Fish hatcheries have been used since the Civil War, but they did not become an effective tool to improve U.S. fishing until 1950. The chief difference was selective stocking. There were many stocking failures before 1950 because rearing and planting fish were inexact sciences.

'New Look' in Hatcheries

The "new look" of the 1950s and 1960s has come from evaluating species, their needs, and environmental conditions under which they would most likely survive. Other hatchery improvements are better diets, more research on control of diseases and parasites, better water in rearing ponds, and better brood stock to provide healthier fish.

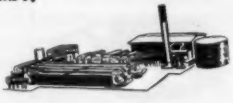
U.S. Facilities

"Today, managers of Federal facilities weigh environmental situations before attempting to stock fish," says Dr. Leslie L. Glasgow, Assistant Secretary of the Interior for Fish and Wildlife and Parks. "The idea is to plant fish where they will best thrive."

The 100 hatcheries operated by Interior's Bureau of Sport Fisheries and Wildlife (BSFW) are concerned largely with waters on Indian lands, national parks and forests, military reservations, and public reservoirs. Waters are stocked where native fish are not sport species, or where game species do not occur in sufficient numbers.

Warm- & Cold-Water Species

Warm-water and cold-water species--catfish to salmon--are raised in hatcheries, which benefit commercial and sport fishermen. Pacific salmon and steelhead trout from Northwestern facilities help maintain West Coast sport and commercial fisheries. A hatchery in Maine helps to reestablish runs of Atlantic salmon in streams along New England coast.



ANADROMOUS FISH CONSERVATION PROGRAM GETS MORE BENEFITS

The Nation's anadromous fishes--salmon and other species that ascend streams and rivers from the sea to spawn--are getting increased benefits from a 4-year extension, which began July 1, of the Anadromous Fish Conservation Act of 1965.

Congress has authorized appropriations up to $6 million for fiscal year 1971, $7.5 million for 1972, $8.5 million for 1973, and $10 million for 1974--a total of $32 million dollars, $7 million more than was provided over the past 4 years.

U.S. Share Up to 60%

Under the new program, the Federal share of project costs can be increased from 50% to a maximum of 60% when two or more States with a common interest in any basin enter into an agreement with Secretary of the Interior Walter J. Hickel.

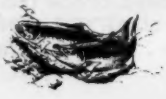
The program is administered by both agencies of the Fish and Wildlife Service--the Bureau of Sport Fisheries and Wildlife, and the Bureau of Commercial Fisheries.

Commissioner's Statement

Commissioner for Fish and Wildlife, Charles H. Meacham, said: "Man has polluted the streams and estuaries, built impassible barriers, and generally damaged the environment of anadromous fish. Their abundance has been sharply reduced and some entire runs have been destroyed. Federal-State cooperation is helping to reduce losses, develop new runs, and increase existing stocks in some areas."

Great Lakes Species Included

The Anadromous Fish Conservation Act applies to anadromous species and to those Great Lakes fish that ascend streams to spawn. These include Atlantic salmon, 5 species of Pacific salmon, shad, striped bass, Dolly Varden, Arctic char, cutthroat trout, steelhead trout, sheefish, river herrings, and 3 species of sturgeon.



FPC IS AVAILABLE TO HOUSEWIVES

"Instant Protein," the first food-grade fish protein concentrate (FPC) to be approved by the U. S. Food and Drug Administration, is on the market.

The manufacturers, Alpine Geophysical Associates, say they are marketing it first in New York and New Jersey supermarkets, and then will expand into New England.

Instant Protein

The FPC is a light-colored powder in half-ounce envelopes, 8 in a package. Alpine says its product has only the faint aroma of fresh fish. When blended with foods, it does not add a fish flavor and fortifies them with animal protein at a small cost per serving.

Consumer testing showed that Instant Protein blends well with flour products--bread, cakes, rolls, and cookies--and with rice products. Mixed with these items at about 10% level, it produces virtually no change in basic cooking characteristics. With most of these products, only a slightly intensified color is noticeable.

Alpine says that the powder, added to a basic spaghetti sauce, can produce meat-type sauce stock that would provide about half of a person's daily need of animal protein for about 6 cents.

BCF TO PROMOTE U.S. FISHERY PRODUCTS AT WORLD FOOD FAIR

In cooperation with U. S. Department of Agriculture, BCF will return to Brussels, Belgium, this fall to introduce U. S. fishery products at the 2nd International Food Industry Fair, Sept. 2-7. It will be BCF's 25th participation in Western European food fairs.

U.S. Industry Invited

U. S. producers and processors of fishery products are invited to attend. Such firms are not required to send representatives because BCF personnel will coordinate activities. Floor space, adequate display cabinets, and interpreter services will be provided free.

For More Information

Information may be obtained from Office of International Trade Promotion, Bureau of Commercial Fisheries, 1801 N. Moore St., Room 401, Arlington, Va. 22209. Telephone: area code 703, 557-4731.

EDA AIDS FISHERIES IN HOMER, ALASKA

The Economic Development Administration has approved a $213,000 grant and a $123,000 loan to help develop port and fisheries facilities and to create 52 new jobs in the City of Homer, Kenai Peninsula, Alaska. Homer is providing $90,000 to complete the $426,000 project.

Port Improvements

The funds will be used to extend an existing 130-foot dock by 150 feet and add a pier for mooring seagoing vessels. The improvements will provide a port for the Coast Guard vessel 'Ironwood'. A 250-vessel fishing fleet depends on it for marine protection and ice breaking.

Allow Sea Shipments

The improvements also will allow shipment of seafood products by water instead of overland, and provide needed anchorage for oceangoing freighers and tankers (now these are diverted to other ports for berths).

ERRATA - CFR MAY 1970

1. Who put snap in snapper? It wasn't BCF Technological Laboratory in Seattle, Wash., as stated on p. 62. It was BCF Technological Laboratory in Pascagoula, Miss. The work was done by Harold C. Thompson and Mary H. Thompson.
2. "United Kingdom to Abandon Fathom Measurement," p. 50. One fathom equals 1.83 meters (not 0.914 a meter).

--Frank G. Morera

STUDY SALMON'S VULNERABILITY TO MIDWATER TRAWLING

BCF's largest research vessel, the 215-foot 'Miller Freeman', returned to Eureka, California, on May 9 after a 3-day cruise to investigate the vulnerability of salmon to midwater trawling (Cruise F70-2). The cruise was a response to growing concern over the impact midwater trawling in salmon-producing areas by Soviet and Japanese stern trawlers off U.S. could have on west-coast salmon stocks. Soviet experts have said often that they do not believe in harvesting salmon on the high seas; also, that salmon are taken rarely in their fishery for hake and rockfish off U.S.

Objectives

The cruise's primary objective was to determine vulnerability of chinook and silver salmon to Soviet-type midwater trawling tactics in 2 situations: when fishing specifically in salmon concentrations, and when fishing on hake schools in areas where salmon are concentrated.

Operations Area

The operation was conducted from Eureka because fishermen in recent years have reported Soviet vessels fishing in May off northern California where salmon were concentrated. Also, interviews with troll salmon fishermen on the day before departure (May 5) indicated salmon were concentrated in Eel Canyon area between Eureka and Cape Mendocino, about 15 miles off shore.

Silvers (cohos) were taken in "blue water" from surface to 10 fathoms. Chinooks were found from 8 to 20 fathoms in "brown water". Fishing was conducted in area north and south of Eel Canyon (approximately 40° 40' N.) from 8 to 20 miles off shore.

Vessel Description

The Miller Freeman is rigged as a stern trawler. She is powered by a 2,150-hp diesel engine driving a single controllable pitch propeller. She is smaller, but has slightly more horsepower, than the Soviet 'Mayakovskiy' stern trawlers (215 versus 270 feet), the dominant class of Soviet stern trawler off U.S. The Freeman was capable of as much or more towing power than Soviet trawlers. She was equipped with two resolution echo sounders, operating at 38 and 100 kHz, which were used for locating concentrations of organisms in midwater.

Gear

The two midwater trawls fished were the 'Cobb' 648 pelagic trawl and the Mark I Universal trawl. The 648 trawl was constructed of $2\frac{1}{2}$-inch mesh and had a fine mesh liner in the last 12 feet of cod end. The 648 trawl is symmetrical with 116-foot headrope, footrope and breastlines; it gives a design opening of about 68 feet square. It was towed with double bridles and spread with 7- by 12-foot V-doors weighing about 2,000 pounds each.

The Mark I Universal trawl, also constructed of $2\frac{1}{2}$-inch mesh, had a fine mesh liner in cod end. The headrope and footrope are both 121 feet long with breastlines of 63 feet. A 30- by 50-foot opening has been achieved when towed at around two knots. The Mark I was principal gear used in 1967 hake fishery; it has caught over 50 tons on several occasions. This trawl was rigged with three bridles and the V-doors mentioned previously.

Both trawls were towed with $\frac{5}{8}$-inch electromechanical cable. A pressure-sensitive, electrical, depth-telemetry system was used to determine trawl depth during fishing. Telemetry transmitters were positioned at each door. Also, on first tow a wireless netsonde was used to monitor trawl opening and presence of fish below, within, and above trawl. The echo-sounding side of this system operates at 200 kHz with information being telemetered back to vessel at 50 kHz. A receiving hydrophone was towed from port side and connected to a readout unit in pilot house.

Methods

Prior to midwater trawling, salmon trollers in Eureka area were interviewed to determine areas and depths of major salmon concentrations. During operation, trollers were contacted via marine radio to insure that Freeman operated in greatest salmon concentrations.

When in a reported salmon area, midwater trawling was conducted at depths salmon were

caught by commercial troll fleet. Trawling also was conducted in scattering layers located with echo sounder. Over 3-day period, trawling was scheduled to cover all hours of day and night.

The fishing procedure was to set trawl at reduced power and allow the gear to settle to desired depth before applying towing power. Trawling speeds were varied from $2\frac{1}{2}$ to $5\frac{1}{2}$ knots. This corresponded to power settings of one-quarter to full power. Catches were enumerated. All salmon were identified, sexed, measured, and pertinent biological data collected. Also, a representative sample of hake was measured and examined.

RESULTS

18 hauls were made during 3 days. The trawl was fished 17 hours and towed 65 nautical miles. Depths of tows ranged from surface to 43 fathoms.

Only 17 salmon--all chinooks (Oncorhynchus tshawytscha)--weighing total of 41 pounds were captured; the best haul yielded 8 fish. The fish ranged from 13 to 29 inches and up to 8 pounds. Although schools of coho salmon (O. kisutch) were sighted in area prior to trials, none was seen or captured. On day Freeman caught the 17 salmon, the commercial troller 'Kristy' in same area caught 217 salmon, 117 legal size.

Besides salmon catches, most common catches were hake (Merluccius productus) and squid (Loligo opalescens). The salmon were feeding extensively on squid.

Gear Failures

Gear failures plagued cruise from very beginning. These resulted from large strains caused by trawling at high speeds.

Conclusions

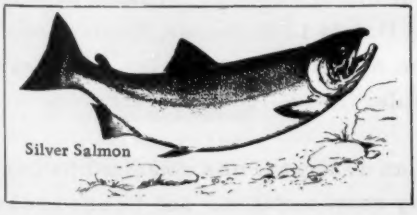
The results were inconclusive. Catches were disappointingly small. This may have been due to: fish not concentrated in areas or at depths where fishing was conducted; fish present in concentrations but avoided net; or, gear not fishing properly.

The salmon were not schooling well. Schools were not detected either visually or with fish-finding echo sounders. Trawls were not fished in scattering layers judged characteristic of hake; this could explain low catches of hake. Scattering layers fished were probably "feed" (plankton) because considerable numbers of euphausiids were enmeshed in trawl wings.

The 7- by 12-foot V-doors were too large for Mark I Universal trawl. Due to large door size, greater than normal spreading forces were exerted on net. This was apparent from large horizontal wire angles of trawl warps during fishing. Also, there was only minimal amount of chain on trawl wings. The combination of these two factors may have resulted in a reduced vertical opening, which could have affected catches.

It is difficult to trawl from Freeman at high speed with type of net used. Drag on net increases at about the square of the speed. This results very rapidly in large drag forces at high towing speeds. The use of larger meshes forward in the net would reduce drag. But it is still doubtful that speeds could be increased very much more than those obtained.

For further information contact: A.T. Pruter, Acting Base Director, Exploratory Fishing and Gear Research Base, 2725 Montlake Boulevard East, Seattle, Washington 98102 (Phone: 583-7729).


Silver Salmon

Chinook Salmon

U.S. AND POLAND SIGN FISHERIES AGREEMENT

The United States and Poland signed in Washington on June 13 an agreement on fisheries off the U.S. Middle Atlantic coast. The agreement extends and modifies an agreement originally concluded on June 12, 1969, in Warsaw, that protected scup, flounder, and hake--species important to U.S. sport and commercial fishermen. The latest agreement continues and expands protection for those species. It also broadens the protective measures to cover black sea bass, menhaden, and river herring. U.S. scientists agree that fishing of these resources should be limited.

Poland Will Refrain

Poland will not fish those species along Middle Atlantic coast and will avoid depleting them throughout the year.

Poland will continue to refrain from fishing during winter months in specified offshore area of Middle Atlantic--roughly between the 50-100 fathom zone, where bottom species concentrate early in the year. The effective period of this provision had been extended 15 days under the new agreement to apply from January 1 through April 15.

3 Loading Zones

In return, Polish fishermen will continue using, except during summer, 3 areas along mid-Atlantic coast within 9-mile contiguous fishing zone of the U.S. for unloading and transferring fish catches. One area is off Long Island. The second area is off New Jersey, south of Atlantic City. The third is off Virginia, north of Chesapeake Bay. No fishing by Polish vessels is allowed within U.S. contiguous fishing zone.

Port Entry

Each Government will continue to provide for entry of a certain number of fishing and supply ships into certain ports of the other country. In return for Polish cooperation in conserving species of special concern to U.S. fishermen, U.S. facilitation of entry by Polish fishing vessels into certain U.S. ports was broadened.

Fishery Research Cooperation

The Agreement provides for cooperation in fishery research designed to improve future conservation programs in the Middle Atlantic.

Provision is made for visits of fishery representatives and inspectors to each other's fishing vessels in the Middle Atlantic.

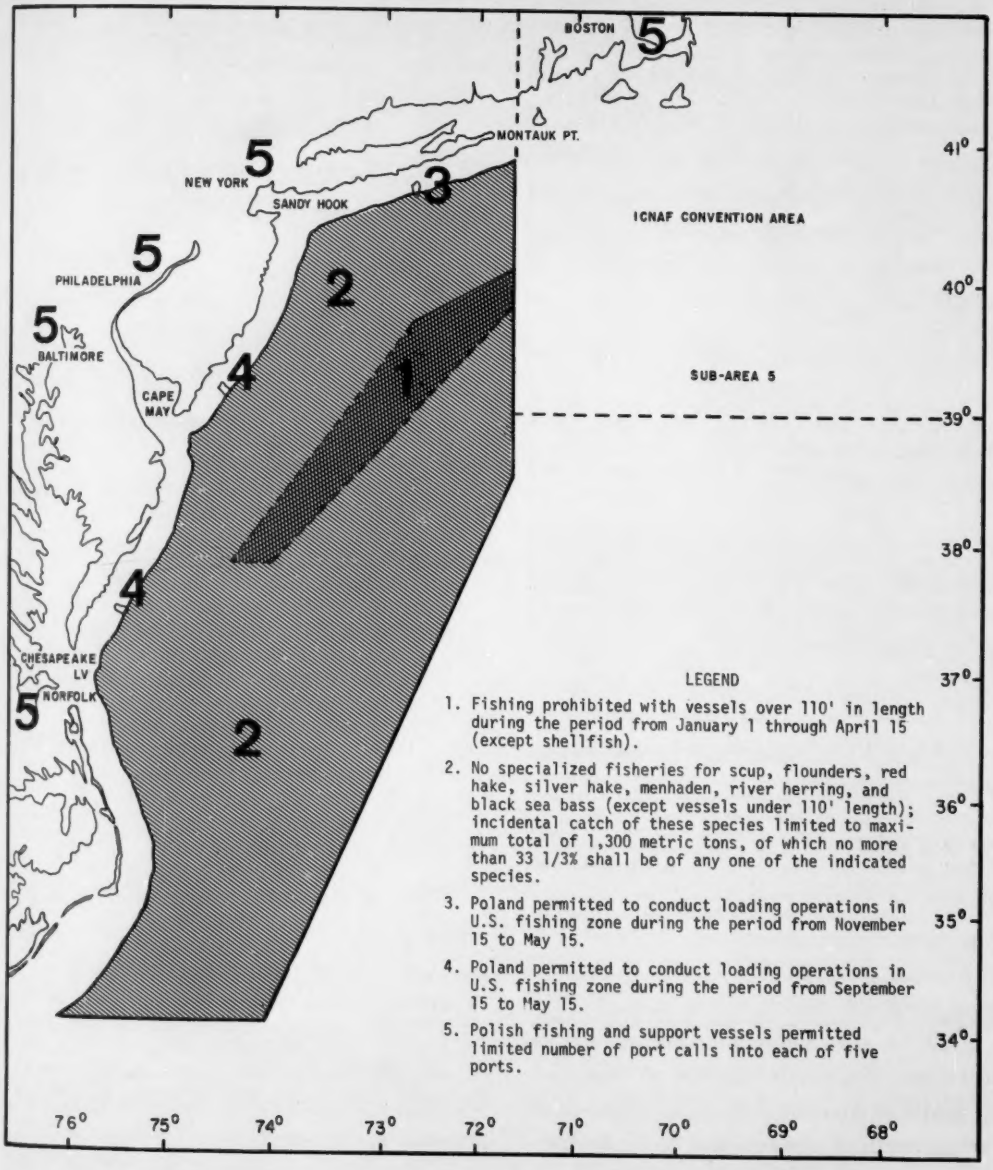
The Agreement will remain in force through September 30, 1971.

The Polish delegation was led by Vice-Minister Romuald Pietraszek, Ministry of Shipping.

The U.S. delegation was headed by Ambassador Donald L. McKernan, Special Assistant to the Secretary of State for Fisheries and Wildlife.

Both delegations contained fishing industry representatives and technical advisors.

U.S. - POLAND FISHERIES AGREEMENT
effective June 13, 1970



LEGEND

1. Fishing prohibited with vessels over 110' in length during the period from January 1 through April 15 (except shellfish).
2. No specialized fisheries for scup, flounders, red hake, silver hake, menhaden, river herring, and black sea bass (except vessels under 110' length); incidental catch of these species limited to maximum total of 1,300 metric tons, of which no more than 33 1/3% shall be of any one of the indicated species.
3. Poland permitted to conduct loading operations in U.S. fishing zone during the period from November 15 to May 15.
4. Poland permitted to conduct loading operations in U.S. fishing zone during the period from September 15 to May 15.
5. Polish fishing and support vessels permitted limited number of port calls into each of five ports.

OCEANOGRAPHY

SEEK EVIDENCE THAT NORTH AMERICA & AFRICA ONCE WERE JOINED

ESSA oceanographers aboard the 'Discoverer' left Miami, Florida, on July 7 to probe the bottom of the North Atlantic between North America and Africa. They plan to obtain a continuous record of the ocean bottom and subbottom in a 3500-mile-long strip from Cape Hatteras, N.C., to Cap Blanc, Mauretania, in northwest Africa. They will return Sept. 17.

Electronic instruments will record the shape of rock strata, including layers miles beneath ocean floor, and their magnetic and gravity fields.

Were N. America & Africa Joined?

The geophysical information obtained on the 7000-mile trip will be applied to solving vital questions--for example, was North America once joined to Africa? Some prominent scientists believe the U.S. east coast and Africa's northwest coast were joined eons ago, with Cape Hatteras against Cape Blanc.

"The ESSA expedition will seek information about the growth and development of the Atlantic Ocean basin as the North American and African continents split and drifted apart to their present positions."

Continental Drift Theory

According to the continental drift theory, the earth once had one or two large land masses. These began to split 200 million years ago. The continents are drifting at about an inch a year in earth's mantle, the part of earth's interior that lies between molten core and crust. The drifting produced the separation of the supercontinent or supercontinents.

Discoverer's Track

The Discoverer will work along a 250-mile-wide path between Cape Hatteras and Cap Blanc. If the two capes once were joined, the evidence may be found in this strip of the ocean's floor.

The expedition will gather data on the nature of rock structures of deep sea bed. Such information is essential to understand how ocean floor was formed--and to assess geologic formations associated with mineral and oil deposits.

Geophysical information will be sought on active earthquake zones in North Atlantic Ocean basin, useful in understanding earthquakes. (See map page 19.)

RECOVER OLDEST SEDIMENTS SO FAR FROM ATLANTIC BOTTOM

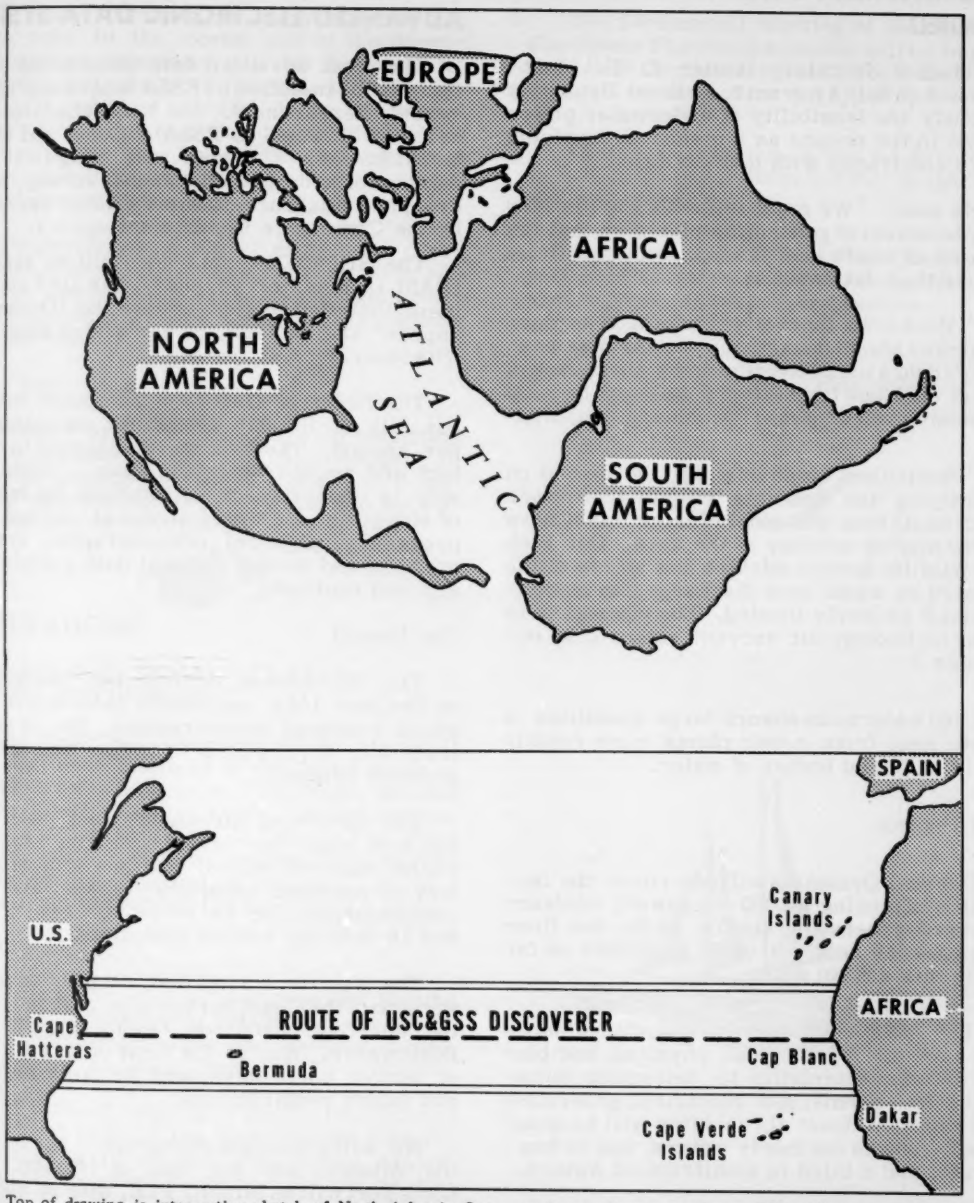
History of the very early development of the Atlantic Ocean has been probed by scientists aboard the 'Glomar Challenger' during Leg Eleven of the Deep Sea Drilling Project. Leg Eleven began in Miami, Fla., on April 8 and ended in Hoboken, N.J., June 1.

Reporting recovery of the oldest sediments yet obtained from the ocean bottom were John I. Ewing, of Columbia University's Lamont-Doherty Geological Observatory, and Dr. Charles D. Hollister, of Woods Hole Oceanographic Institution, cruise co-chief scientists.

The scientists described limestones that contain an abundance of shallow water fossils that lived 150-160 million years ago (Jurassic). This indicates that the early Atlantic Ocean was shallower than it is today. These limestones were deposited shortly after the ocean was formed--as North America separated from Europe and Africa. The separation of the continents occurred no earlier than the beginning of Jurassic time, about 180 million years ago, the scientists say.

Atlantic Widening

Since that time, the continents have been moving farther apart--increasing the size of the Atlantic Ocean. "New rock that comes from deep within the earth is forming the new Atlantic Ocean floor in the central part of the ocean." Compared with the earth's age (4.5 billion years), or the oldest dated rocks on the continent (3.5 billion years), the Atlantic is very young.



Top of drawing is interpretive sketch of North Atlantic Ocean as it may have existed some 200 million years ago after the continents surrounding it broke up and began to drift apart. Bottom drawing depicts the 250-mile-wide area across which Cape Hatteras and Cap Blanc may have drifted apart and the USC&GS Ship Discoverer's route as she seeks some of the answers to the age-old mystery. The ship will spend two months this summer probing the bottom of the sea between the two continents.

UNDERWATER POWER PLANTS STUDIED

Interior Secretary Walter J. Hickel announced on July 3 a grant to General Dynamics to study the feasibility of underwater power plants in the oceans as a means of supplying more electricity with less pollution.

He said: "We must immediately plan for the placement of generating plants so that the impact of waste heat discharge is beneficial rather than detrimental.

"I think bold, innovative ideas such as placing power plants beneath the oceans may possibly ensure the protection of the environment and at the same time allow a safe and orderly expansion of our power-producing capacity.

"Particular emphasis will be placed on identifying the possible effects that power plant waste heat and other wastes might have on the marine ecology of the area. Our Fish and Wildlife Service advises that an upwelling created by waste heat discharge can be beneficial if properly located. The concept is to make technology our servant, rather than our master."

Cold waters can absorb large quantities of waste heat from power plants more readily than can inland bodies of water.

The Project

General Dynamics will determine the feasibility of placing a 1000-megawatt, nuclear-powered generating station on the sea floor down to 250 feet. It could be placed as far as 25 miles from shore.

The study will examine several offshore sites for their geological, physical, and biological characteristics to determine suitability for submerged electrical generating stations. At least three sites will be evaluated: one in northerly waters, one in temperate, and a third in semitropical waters.

'RESEARCHER' WILL HAVE MOST ADVANCED ELECTRONIC DATA SYSTEM

The most advanced data-acquisition system will be installed on ESSA's oceanographic vessel 'Researcher'. She was scheduled for delivery in June to ESSA's Coast and Geodetic Survey. The ship will bring to 15 the number of hydrographic, ocean survey, wire drag, and tidal current survey ships operated by the Commerce Department agency.

The $1,000,000 data-acquisition system (DAS) is a major advance over DAS equipment installed in 1965 aboard the 'Oceanographer' and, in 1967, on her sister ship, the 'Discoverer'.

The heart of DAS is a computer with a capacity of 100,000 arithmetic calculations per second. The system is designed to collect and record scientific data. "When the ship is underway, it will sample (by means of shipboard and towed sensors), record and process geophysical, oceanographic, hydrographic, and meteorological data automatically and routinely."

The Vessel

The $10-million Researcher, christened in October 1968, can handle helicopters and small research submersibles. She is electronically equipped to probe the ocean's greatest depths.

The 2800-ton, air-conditioned vessel is 278 feet long. Her normal operating range is 13,000 nautical miles. She has 4000 square feet of enclosed laboratory space, and accommodations for 13 officers, crew of 54, and 18 men and women scientists.

The ship is a modified, slightly smaller version of the Coast Survey's largest vessels, the 303-foot, 3805-ton Oceanographer and Discoverer. She is the first of a new class of survey ships developed to meet present and future requirements.

She will conduct oceanographic surveys in the Atlantic and the Gulf of Mexico. Her home port will be Miami, Fla., site of ESSA's Atlantic Oceanographic and Meteorological Laboratories; initially, she will operate out of ESSA's Atlantic Marine Center in Norfolk, Va.

WORKSHOP ON MARINE WIRE ROPE

A 3-day workshop on the problems of a wire rope in the ocean and at the ocean-atmosphere interface will be held at The Catholic University of America in Washington, D.C., August 11-13. It is sponsored jointly by the National Oceanographic Instrumentation Center, the Office of Naval Research, the U.S. Navy Ship Systems Command, and the university.

The performance of wire rope is very important to oceanographers because their research instruments are complex and costly and frequently must be retrieved from depths greater than 10,000 feet.

Wire Rope Users

Fishery and off-shore mineral activities use wire rope extensively. So does the U.S. Navy in salvage operations. The "hard hat" diver who works on the bottom and the retrieval devices are got there by cable.

PUBLICATIONS

NEW FOLIO IN SERIAL ATLAS OF MARINE ENVIRONMENT

The American Geographical Society (AGS) has published Folio 19 of its Serial Atlas of the Marine Environment: "The Water Masses of the North Atlantic Ocean; A Volumetric Census of Temperature and Salinity," by W.R. Wright and L.W. Worthington, Woods Hole Oceanographic Institution (Mass.). It contains 8 pages of text and color plates. Price: $10. AGS is at Broadway & 156th St., New York, N.Y. 10032.

"This Folio is a tabulation of the volume of water in the North Atlantic Ocean by intervals of temperature and salinity, based principally on data from the International Geophysical Year. The intervals range from 2^{o} C x 0.2‰ of salinity in the surface waters to 0.1^{o} x 0.01‰ in the water colder than 2^{o}, providing a fine-scale description against which future water mass changes can be discerned."

MEETINGS

1. The 23rd annual meeting of the Gulf and Caribbean Fisheries Institute will be held at the Inter-Continental Hotel, Curacao, Netherlands Antilles, Nov. 8-12, 1970.

   Of the 4 sessions, 2 will be devoted to topics of specific interest; 2 will emphasize current research.

2. The International Game Fish Conference will hold its 15th annual meeting, Nov. 13 and 14, immediately after Institute.

For information: Executive Secretary, Gulf and Caribbean Fisheries Institute, 10 Rickenbacker Causeway, Miami, Fla. 33149.

CRABBING MAY BE INEXPENSIVE SPORT

"Checked the price of crab meat lately?," asked the Texas Parks and Wildlife Department in June. The Department had--and suggested this cheaper way to obtain crab meat:

Unless your wallet makes a large, uncomfortable bulge in your hip pocket, a gander at the cost of picked meat will probably kill your craving for crab à la king.

But there is an alternative to plunking down hard cash for this saltwater delicacy--catch the crabs yourself.

True, hard cash is needed for equipment, but it doesn't take much money, and the equipment can be used again and again. And the money you spend gets some extra mileage by being spent for two things, recreation and food, instead of just for food.

Handlining for Crabs

The most common method of catching crabs is by handlining. A piece of meat tied to a strong string, a dip net, and a bucket or tow sack to keep the crabs in is all that is needed; a modest layout of cash indeed.

The meat is lowered into the water. When a crab tugs on it, the line is pulled upward slowly with the crab hanging on, and the net is used to dip out the crab.

Trotlining By Serious Crabbers

Trotlining is a method used by more serious crabbers. A line with several pieces of meat dangling from strings is tied between two poles. The bait is visited periodically, and the crabs are scooped up with a net.

Crab nets and wire crab pots (traps) are also used. The pots cost from $3 to $5 depending on size and construction, but the average crabber does not care to make this investment. Since the use of crab pots usually takes the sport out of crabbing, most crabbers stick to less sophisticated methods.

The Right Bait?

The right bait to use is a debatable question among crabbing enthusiasts. Some will swear by chicken necks and wings, while others prefer beef scraps. The availability of chicken in the home refrigerator and its ability to withstand several hours of crab fishing makes it a popular bait.

Blue Crabs Spawn in July

Spawning blue crabs fill the Gulf surf in July, and large numbers of people flock to the beaches to take advantage of this season. Sponge (egg-carrying females) and spent (spawned females) crabs are easy prey for dip nets. However, Texas law now prohibits the keeping of sponge crabs, easily recognized by the orange glob of eggs on their underside.

Sport Crabbing Valuable

A survey of the Galveston Bay fishery by Texas Parks and Wildlife Department biologists provided information to substantiate the popularity of sport crabbing and its impact on an area. Data gathered from the survey determined that sport crabbing contributes considerably to the area's economy.

Department personnel counted 41,000 crabbers and interviewed 887 from April through December of 1968.

Fifty stations, each selected for ease of public access, were established for the study. Bridges, ditches, bayous, piers, rock groins, jetties and beaches were checked for crabbers.

The survey showed that crabbing activity usually depends upon the weather, although people were observed crabbing throughout the year.

Women 38% of Crabbers

The fairer sex are ardent crabbers and made up 38% of those interviewed. Children under six years of age comprised 22% of the total. Also, sportsmen often combine crabbing with fishing. Of the 1,775 groups encountered, 15% did both. Generally, it appears that adults fished while their children went crabbing. This kept children nearby, and often the children provide the only seafood to take home.

Cost of Sport

The average cost of the sport was $.80 per person, or $3.00 per group.

FISHERY OCEANOGRAPHY--VII
ESTIMATION OF FLOW IN GULF OF ALASKA

Felix Favorite

Perhaps the most common immediate reaction to oceanographic studies by fishery groups is that the ocean is too large and that the extensive environmental studies required to direct fishery activities are too time consuming and expensive. After all, aren't you better off to cast your nets into the water and see if any fish are present than to use the time to make environmental observations and hypothesize the probability of catching fish. Of course, the answer to this question may be yes, especially if visual or electronic devices indicate the presence of fish. But in this manner one never answers the question why--why are the fish present; why are they here at this time; why are they so few or so abundant? How many fishermen spend the winter wondering why last summer's fishing was good or bad and if next year's will be worse or better? As soon as one begins to examine the causes of fluctuations in the sizes of catches, new problems demand attention. Information on reproduction and survival of the harvested stocks is required to estimate the numbers of fish in the sea. One must also know about the vagaries of the environment and the reaction of fish to its changes.

Much is said today about sea-surface temperatures as aids to fishing and the potential of satellites to monitor surface temperatures, but these data are in some respects very superficial. They are only indicative of a thin surface layer and are not necessarily indicative of the direction and intensity of ocean currents. It is these currents which disperse eggs and larvae of marine fishes into areas where conditions are favorable or unfavorable for survival, and transport passively drifting fishes from one area to another. Also, current boundaries appear to serve as guideposts to migrating fish, such as the Pacific salmon (genus Oncorhynchus).

Clues to Salmon Migrations

Frequently, unusual displacements of fish stocks occur. These are usually accompanied or foreshadowed by abnormal environmental conditions. Until satellite systems that monitor flow are devised, we must explore the methods presently available. We believed from the beginning of our studies that ocean currents and the inherent water properties of each current system provided some clue to migrations of salmon. Previous articles in this series showed that temperature and salinity distributions provide an indication of the southern limits of salmon distribution--but little information concerning their migration routes. These routes appear to be associated with the huge Subarctic gyres.

Geostrophic Flows

Usually, currents or water transport in these gyres are ascertained by the geostrophic method and are called geostrophic flows. Geostrophic velocities are proportional to the slope of the sea surface derived from observations, at two or more locations, of the vertical distribution of temperature and salinity above an arbitrarily selected reference level at which horizontal pressure gradients are believed to be negligible. The relation between the vertical distribution of mass (determined by distribution of temperature, salinity, and depth) and of flow is somewhat like the old query: which came first, the chicken or the egg? Does the flow result in the observed distribution of mass, or does the distribution of mass result in the flow? We will accept the fact that a slope indicates an imbalance of energy at the sea surface and consider how to ascertain this imbalance and its relation to flow.

Dr. Favorite is an Oceanographer with BCF's Biological Laboratory, 2725 Montlake Blvd. East, Seattle, Wash. 98102.

U.S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Reprint No. 878

Above 4° C., water expands as the temperature rises. Thus, a column of warm water will stand higher above the common reference level than a column of cold water; a column of fresh water will stand higher than a column of salt water. As there is no way to ascertain a true reference level, an arbitrary depth is selected--usually where the least change of temperature and salinity with depth occurs. Although there are exceptions, a reference level of the order of 1,500 decibars is selected; this approximates a depth of 1,500 meters. By summing up effects of vertical structure of temperature and salinity on height of water column from this level at two or more locations, we are able to ascertain the topography of the sea surface relative to this level--and resulting geostrophic flow at sea surface relative to flow at this level. This is assumed to be zero and, in practically all cases, is insignificant compared to surface flow.

If you liken this topography to that of land, one might imagine intuitively that flow would be downslope. In the equilibrium state, the tendency for water particles to move downslope (pressure force) is assumed to be balanced by a centrifugal reaction (Coriolis force), and the resulting flow is normal, or at right angles to the slope. In the northern hemisphere, upslope is to the right of the flow as one looks downstream; the speed of, or transport of water in, the flow is related directly to steepness of slope. Thus, cyclonic (or counterclockwise) flow occurs around the topographic lows (the Gulf of Alaska gyre is an example); anticyclonic flow occurs around topographic highs. Using this technique, we have been able to ascertain geostrophic currents between fishing stations and the general circulation over large fishing areas. Of course, this method assumes unaccelerated, frictionless flow and is a gross simplification of actual flow conditions in the ocean. There is no need to pursue its limitations except to point out that distribution of temperature and salinity at depth are altered slowly, thus transient currents are not represented; furthermore, with even a number of ships, it is impossible to obtain synoptic observations over a large area.

Our early studies in the Subarctic Pacific Region provided some indication of geostrophic currents during summer; subsequent winter cruises provided an indication of currents during that period also. But we never have been able to obtain a continuous year-round picture of ocean currents or of salmon distribution that did not lack continuity in time or space and, therefore, was somewhat fragmentary. This prevented any successful attempts at forecasting environmental or fishery conditions.

Estimating Flow Over Wide Area

There is another method that permits one to obtain an estimate of flow over wide areas. Although it is difficult to integrate into a continuous record of flow, it provides valuable information independent of actual measurements of water properties. The flow in major ocean current systems is dependent upon the stress of the wind on the sea surface. Knowledge of this stress permits us to compute flow generally referred to as wind-stress transport. Although the exact coupling between surface winds and surface ocean currents is complicated and not well known, there are empirical considerations that permit us to obtain an estimate of flow in the open ocean. This is done in the following manner: the mean sea level pressure over the area concerned for a selected period is obtained from the weather records. The accompanying mean winds are derived from the spacing of the isobars, under accepted meteorological concepts, for surface wind stress at grid points. Knowledge of the curl (vector cross product) of the wind stress and the rate of variation of the Coriolis parameter along a meridian permits computation of the north/south transport across a unit length of latitude that would occur when steady-state conditions are reached. Using continuity concepts from grid point to grid point, commencing at the west coast of North America and proceeding westward, one is able to construct a circulation pattern that has been shown to approximate actual flows based upon the time-consuming and costly shipboard observations.

Gulf of Alaska Gyre

As indicated in Article V, we are particularly concerned about the effect of the Gulf of Alaska gyre on the distribution of salmon. If we ignore boundary conditions imposed by the coast, and investigate seasonal effects of mean monthly wind-stress transports in the Gulf of Alaska for the decade 1950-59, several interesting features are evident (fig. 1). There is an appreciably greater flow into and out of the Gulf of Alaska during winter than in summer. Although cyclonic winds (associated

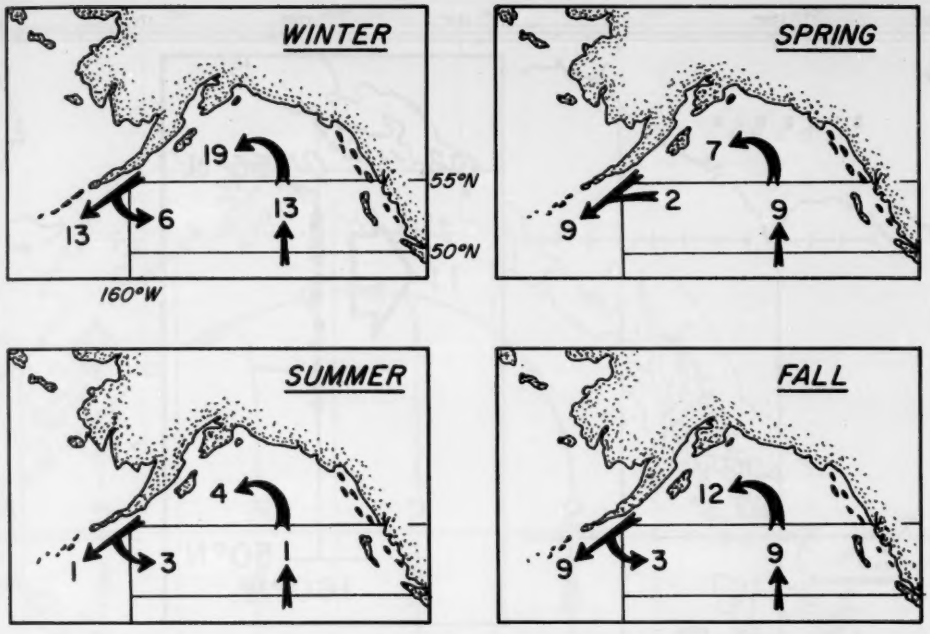


Fig. 1 - Mean seasonal flow (transport [$\bar{X}$ 10^6 m.^{3}/sec.]) into and out of the Gulf of Alaska, 1950-59.

with the low pressure system in the Gulf of Alaska each year during winter) should result in an intensification of flow, the differences appear large because there is little evidence of this intensification in the distributions of temperature and salinity. However, when one considers the monthly values of mean sea level for the same period at Yakutat (corrected for atmospheric pressure and precipitation effects)--an increase in sea level, indicating an increase in cyclonic flow, is found during winter.

There is no recirculation, or eastward flow, during spring. This is interesting because it is the season in which there is a predominant westward movement out of the Gulf of Alaska of sockeye salmon (O. nerka) bound for spawning streams in the eastern Bering Sea. Finally, northward flow across lat. 50° N. is at a minimum during summer, and most of the northward flow across lat. 55° N. is the result of water recirculating in the gyre. In addition to providing an indication of long-term seasonal or annual conditions, this method can be used to ascertain recent conditions--and provide enough insight to permit estimations or predictions of flow on a month-to-month basis.

Computations of geostrophic flow based upon shipboard observations of temperature and salinity, to 1,500-m. depth south of the Alaska Peninsula, indicated a westward transport of 11 x 10^6 m.^{3}/sec. in early March 1970. Data were required from numerous oceanographic stations parallel to the normal coastline because it was imperative to have observations at the high and low points of the topography of the sea surface to compute total flow. Computations of the mean wind-stress transport for February 1970 indicate an equivalent value for westward flow in this area (fig. 2). Furthermore, it is obvious that considerably more details of flow, particularly areas of possible divergence and convergence, are available from the wind-stress charts. Although this is, basically, a theoretical calculation, it is a method that permits insight into conditions in the ocean that cannot be obtained by a single ship or even by several. The technique requires no expenditure of research-vessel time, nor of a large staff to process data. At the end of each month, when the mean sea-level atmospheric pressure is available, the whole process is completed essentially by computer in minutes. It is through such techniques that we will be able to monitor and predict conditions in the

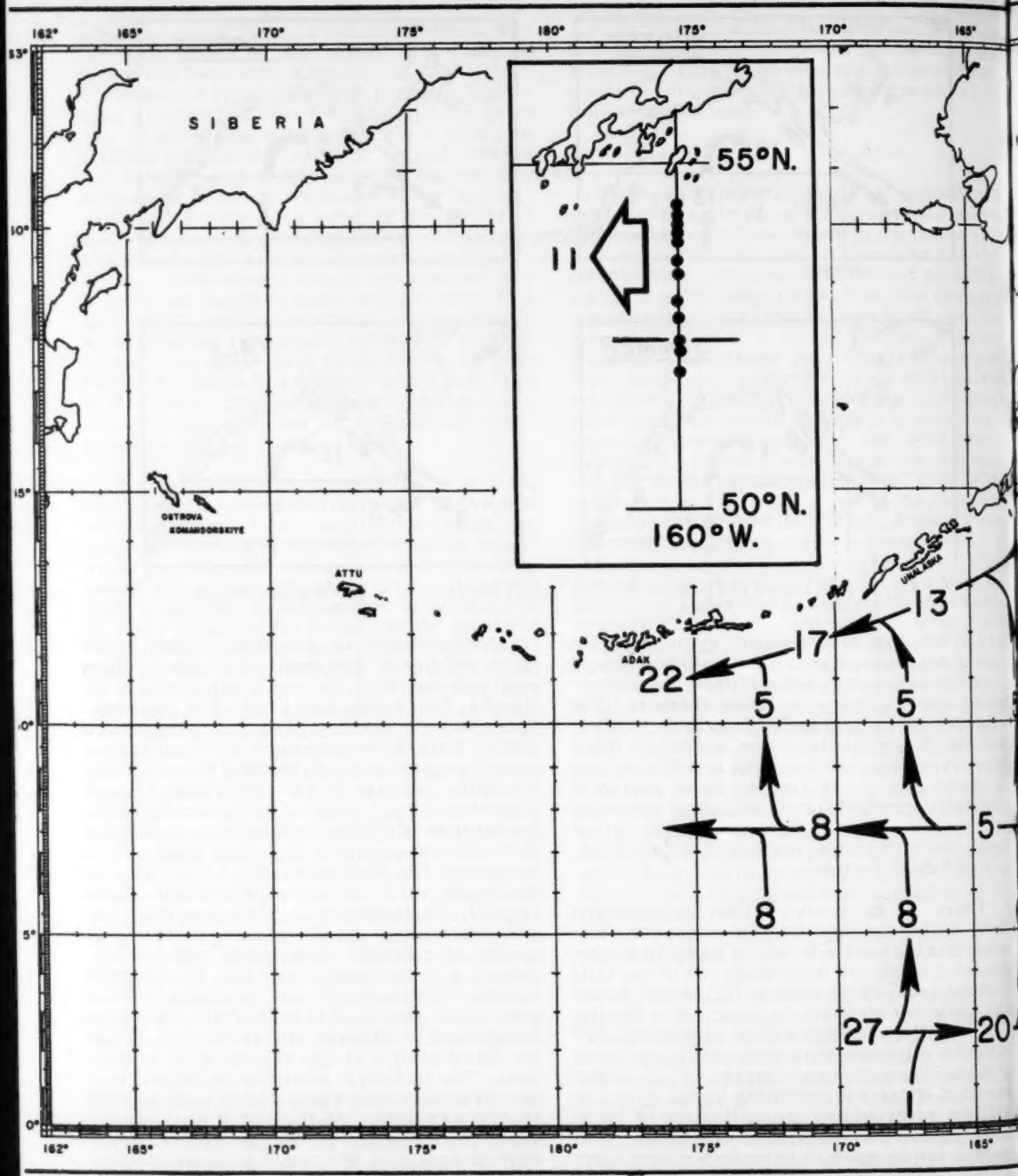
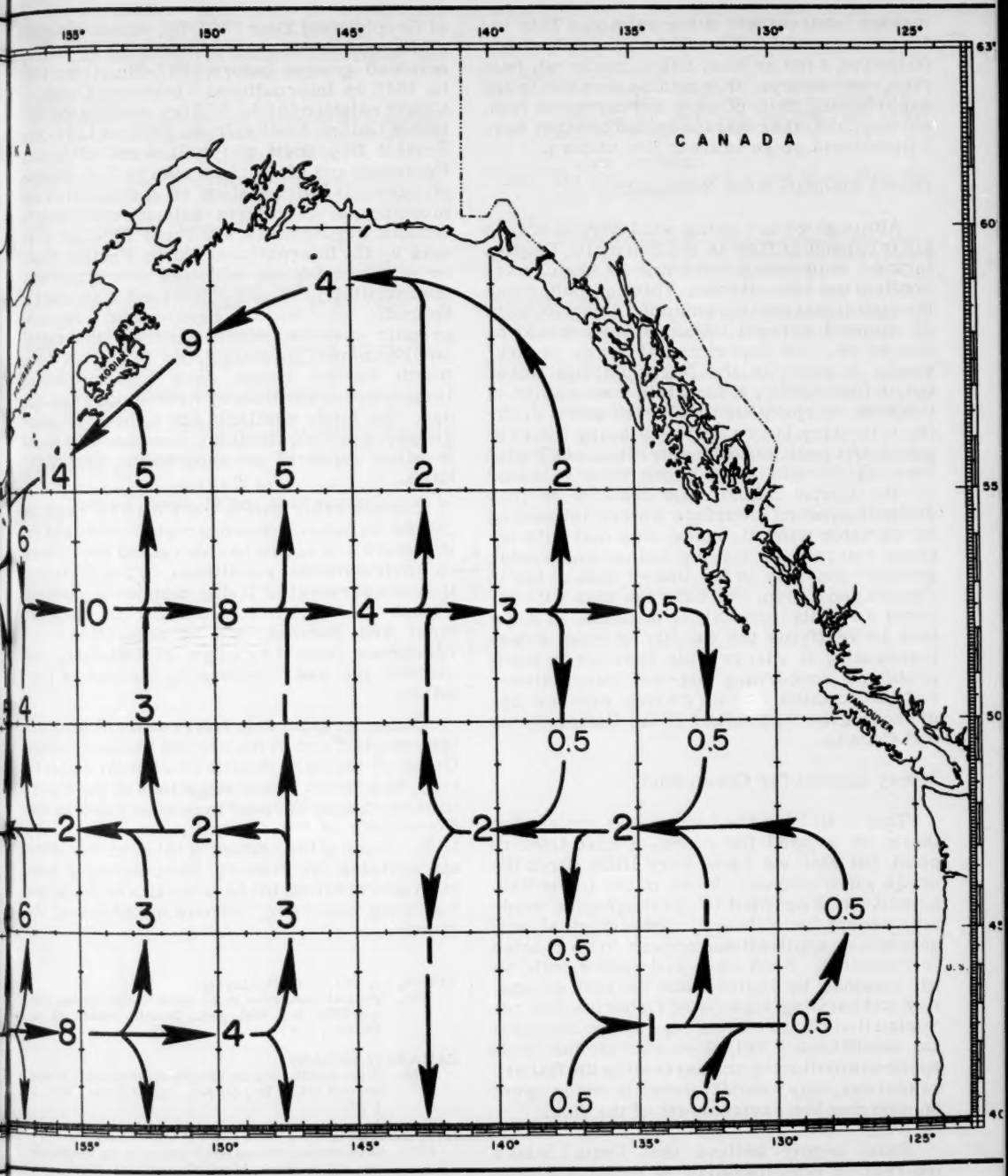


Fig. 2 - Flow (wind-stress transport [X 10^6 $m.^3/sec.$]) in the eastern North Pacific Ocean from oceanographic data obtained at indicated stations.



determined from records of sea level pressure, February 1970. Insert shows flow computed

marine environment of the salmon. This information would be beneficial to other pelagic fisheries, such as tuna, hake, mackerel, herring, and saury. It would be invaluable for ascertaining drift of eggs and larvae of fish, shrimp, and other marine resources that have a planktonic stage in their life history.

Direct Measurement Necessary

Although we are using wind-stress transports to predict flow in the Subarctic Region, further supporting evidence is required to confirm our conclusions. This can only come through direct measurements. A vast system of moored current meter arrays would be expensive. An experimental array is presently in place in the North Pacific Ocean but, unfortunately, it is outside our region of interest. We proposed and developed a drifting telemetry buoy capable of being interrogated and positioned by satellites. Our plan for a north-south line of buoys, to be released off the Kurile Islands and tracked as they drifted eastward in surface waters influenced by variable wind stresses, was met with intense interest by fishing and oceanographic groups--not only in the United States, but in Canada and Japan. Perhaps the plan will become a reality in the future because, in addition to verifying the validity of wind-stress transports, it will provide answers to many problems concerning air-sea interaction--and information concerning weather approaching the west coast of the United States and Canada.

Money Needed for Ocean Study

This article is the last of this series, but there is a need for more. I have tried to point out that we know very little about the ocean environment. Most of the immediate benefits to be accrued by oceanographic studies, except for military, climatological, and geological applications, appear to be related to fisheries. Each week and each month, as we continue to explore and harvest oceans, new and exciting aspects of fisheries are revealed that require knowledge of environmental conditions. Yet, if we exclude the funds spent on monitoring and harvesting the fishery resources, only a small amount is being spent on studying the environment of the fish.

Some people believe that United States interest in oceanography is relatively new. While it is true that the large increase in oceanographic funds followed the International Geophysical Year 1957-58, extensive environmental studies were conducted by fishery oriented groups before 1957-58: from 1927 to 1929 by International Fisheries Commission in relation to life-history studies on halibut in Gulf of Alaska; from 1938 to 1941 over Bristol Bay shelf and southward of Alaska Peninsula and Aleutian Islands by U.S. Bureau of Fisheries in relation to distribution and movements of sockeye salmon returning to Bristol Bay streams; and from 1953 to present by the International North Pacific Fisheries Commission, which is concerned with oceanic distribution of numerous fish stocks. Sporadic cruises by independent oceanographic vessels notwithstanding, the major environmental investigations in the northern North Pacific Ocean have been conducted largely to answer fishery problems. Yet, today, the funds available for fishery oceanography are infinitesimal compared to those in other types of oceanographic investigations.

Considerably more emphasis must be placed on fishery oceanography--now and in the future--if we are to understand the effects of environmental conditions on the distribution and survival of living marine organisms so that we can provide guidelines for management and harvest, aid in protecting these resources from foreign exploitation, and counter the ever-increasing menace of pollution.

Oceanographic data and research summaries compiled and written by the Oceanographic Group at the BCF Seattle Biological Laboratory, as a result of investigations of the Pacific salmon, may be found in Annual Reports and Documents of the Commission dating from 1955. Much of the content of this and the other six articles on Fishery Oceanography have been derived from these reports and from the following papers by various members of the group:

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JOYNER, TIMOTHY
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HURRICANE CAMILLE: A New Experience in Reclaiming Canned Seafood

E. Moret Smith

On August 17, 1969, hurricane Camille struck with unprecedented fury the coasts of Alabama, Louisiana, and Mississippi. She caused damage estimated at over one billion dollars. In Mississippi alone, 40,000 inhabitants suffered hardship, and about 35 miles of coastline were laid waste.

Most details concerning the storm and its effects have been documented on film and paper. It was a new experience in every respect. It is disconcerting to realize that neither the people nor the various governmental agencies were equipped to handle a disaster of such proportions. By using the Gulf Coast as a dramatic example, persons involved in a similar catastrophe in the future can profit from the experiences of those who cleaned up after Camille.

BCF personnel who were in Biloxi, Mississippi, the day after the storm, and who returned later to help clean up, observed the storm's effects on canned seafood products, and the results of efforts to recondition these products.

THE SCENE

For the most part, the seafood industry of Mississippi is grouped on the beach facing the Gulf of Mexico and would bear the brunt of any hurricane. This was the case in Biloxi the day Camille struck. Canneries and processing houses that were not blown away were later reduced to rubble, or swept into the sea by 18-foot tides. On August 18, the day after the storm, 200,000 cases of canned seafoods worth about two million dollars littered warehouses, beachfronts, or were intermingled with wreckage, debris, and silt. There was no consolation for those whose stocks remained on pallets in warehouses because these too suffered water and silt damage.

For days, there was little or no clean fresh water; in most instances, when it was restored, water pressure was inadequate to effectively start the cleanup. Because of the time required to rebuild damaged electric motors, those who had private water systems were only slightly better off. Labor was almost nonexistent as people tried to restore the basic needs of living. Most people were in shock; they did not recover for days. Everyone was staggered by the task of rehabilitating homes and businesses. The future was bleak. Trying to determine just where to begin rebuilding was a task--and this situation can be expected again.

THE NEED FOR A PLAN

Tools Needed:
1. Labor
2. Trucks
3. Warehouse

The only way to avoid a costly cleanup of canned stocks is to move them to a safe area before a destructive storm strikes. Except for relatively small quantities of merchandise, this would seldom be possible. Camille meandered over the Gulf for a week, but forecasters were unable to give a 24-hour advance notice on where she would strike. For this reason, only token quantities of merchandise were moved to safe areas.

Mr. Smith is a Fishery Marketing Specialist with the Bureau of Commercial Fisheries, 239 Frederick Street, Pascagoula, Mississippi 39567. At the request of Biloxi canners, he managed a 2-month can-cleaning operation.

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Fig. 1 - Aerial view of "Cannery Row" Biloxi after hurricane Camille.

Fig. 2 - Some of 200,000 damaged cases of canned seafood in Biloxi.

Within each cannery, the decision about which to move--canned goods, machinery, or both--creates an additional demand on available trucking. To make the most of whatever advance notice is given, a company's plan for maximum evacuation should be developed well in advance of the storm. It should be put into action as soon as it is evident the storm will come close. Most hurricanes push tides of 12 to 15 feet. Canneries on high grounds would be safe from damaging tides, but there are few, if any, in the Gulf Coast area that are 15 feet above sea level. So it is reasonable to suggest that all canneries should have an evacuation plan.

It is difficult to determine what action should be taken after a storm until one has surveyed the damage to installations and stock. There are, however, certain basic steps that would be beneficial. These would require a plan not only for an individual canner, but for other canners and food brokers with large stocks of damaged canned goods.

The Biloxi cleanup was expedited by the finest type of cooperative action. Unfortunately, time was wasted conceiving and organizing it. Had there been a plan for united action prior to the storm, time would have been saved--the time during which cans deteriorated.

Salvage Canned Products

It is important to know that 75 percent or more of the canned goods can be reclaimed almost to original newness. For this reason, and because canned stocks represent needed collateral, I believe that all efforts should be directed to salvaging these canned products.

THE CLEANUP

Tools Needed: 1. Labor
2. Packing cases

After a storm, there may be some uncertainty about what to rebuild first. Assuming

Fig. 3 - Cleanup begins in Biloxi.

it is salvaging canned stocks, TIME becomes vitally important because, inevitably, in TIME canned goods will be worthless. In TIME, the action of saltwater and air will create rust that causes pinholes in a can, or the can will lose eye appeal from blotches in the tin plate. Cans should be reconditioned as fast as possible. Because labor will be short, this will not be easy. Therefore, it would be prudent to hire as much help as possible immediately after a storm.

If work cannot proceed because of the loss of a structure under which to work, the cans should be submerged in water. Steel will not rust as rapidly under water as when damp and exposed to air. In 1947, canned salmon in the 'S.S. Salmon' that sank in 135 feet of water was in good condition after $2\frac{1}{2}$ months; the cans were opened, the salmon removed, repacked, and processed in new cans.

Swimming pools could be used, or a pool constructed by building mud levees covered with plio-film sheets. Hosing the stock with water does not provide the same effect. In fact, hosing silt and salt deposits from the cans provides a perfect situation for rust to develop more rapidly.

It is probable that neither fresh water nor power would be available after a hurricane, but some measures can be taken toward salvaging canned goods. It is desirable to remove cans from wet packing cases, and labels from all cans. Residual chemicals in the paper combine with the dampness to set up an action that speeds rust formation. In Biloxi, cases that remained on pallets, but were saturated, remained wet in the center of the pallet for three months. Even if the cases and labels had dried, as some did on the outside, the rust formation was worse than on those that had been removed. The percentage of cans that were recovered from wet cases was considerably less than that of cans removed from such an environment. An added disadvantage was that production was hindered because more time was required to work from wet cases than from dry ones. The cases disintegrated when handled, spilling the cans; rust will develop more rapidly, especially along seams and at points where labels are attached to cans.

If utilities have not been restored, the cans should be repacked in dry or new packing cases and, later, treated more. For lack of cases, some canners in Biloxi stored cans in retort baskets. As a temporary measure this could be helpful, but in areas of high humidity, this is undesirable. Exposed cans will not be much better off than if left in wet cases. The recovery rate of cans held this way was less than those stored in dry cartons.

WHEN UTILITIES ARE RESTORED

Tools Needed:
1. Labor
2. Fresh water
3. Detergent
4. Scrubbing brushes
5. Steel wool or power buffer
6. Heat
7. Rust-preventive oil
8. New packing cases

Up to this point, everything accomplished was done as a temporary measure. Now cleaning should begin in earnest. Whether accomplished manually or mechanically, the objective is the same: to remove salt, dirt, silt, labels, and rust. It takes at least three weeks to arrange and obtain the services of a mechanical cleaner, so the following is directed at those who wish to clean their canned goods by hand.

A surprising amount of stock can be rejuvenated simply by scrubbing the cans in warm water and detergent. Several Biloxi canners depended entirely on this method for relatively small stocks of canned goods; if accomplished promptly, there is little reason to worry about later effects. Cans showing signs of light surface rust should be set aside for another group of workers to clean with steel wool. A power buffer filled with a fine wire or bronze brush will save much labor. Cans should then be immersed in water held at 180° F., and then dried. Normally, at this temperature, cans will dry without additional effort; if not, they should be passed through a wind tunnel or dried by compressed air.

For several reasons, no attempt was made to recondition unlacquered cans during the Biloxi cleanup. The high unit value of canned shrimp, oysters, and crabmeat made it imperative that these cans receive first consideration. These products were all packed in lacquered, rust-resistant cans. During the time needed for hand-cleaning lacquered cans, almost all unlacquered cans became hopelessly rusted. In Biloxi, only items of low unit cost were in unlacquered cans--fruit drinks and pet food. This should not be

construed as reason not to clean items of low unit cost, because the mechanical cleaners that were used in Biloxi were designed for items of this type--beans, tomatoes, fruit cocktail, etc. Unlacquered cans and badly dented lacquered cans seem to rust at the same rate. Therefore, when cleaning up small stocks, do not separate the two--treat both equally.

On cans that have not been buffed, the lacquer will remain intact. The cans can be packed in new cases, held for at least two weeks, be inspected and defective cans pulled, and then marketed. In Biloxi, the U.S. Food and Drug Administration insisted that all cans not mechanically cleaned should be dipped in water containing 0.2 percent (200 parts per million) free chlorine. If this is necessary, it should be done after hand scrubbing, but prior to flushing cans in 180° F. water. While still warm, cans with all or part of the lacquer removed should be sprayed or dipped in a solution of one part mineral spirits and one part rust-preventive oil, be packed in new cases, and held for observation. A rust-preventive oil, available nationally, is sold in 52-gallon drums under the brand name "Oakite." This brand is mentioned for lack of other names. It does not prevent use of another product that could be superior.

Using only a mechanical lift truck as a labor saver, one Biloxi canner estimated that it cost $1.00 to clean a case of 24 307/113-type cans. Wages were fixed at the time at $1.60 per hour. This cost could be reduced by using a conveyor.

EXTREME CONDITIONS

Tools Needed:
1. Labor
2. Steam
3. Water
4. Chemicals
5. Mechanical cleaner
6. New packing cases

A mechanical cleaner and derusting machine should be used where there is a delay in organizing can-cleaning operations, or where the amount is so great that the race against the formation of rust is being lost. In Biloxi, where most canners had 25,000 or more cases to be cleaned, rust developed faster than hand cleaning could arrest it.

Where large stocks are being hand cleaned, at some point the percentage of cans lost will become so great that it will be unprofitable to continue operations. This should be expected if a mechanical cleaner is not available to speed the can cleanup. When this will become unprofitable is controlled by variables: how long cans have been stored prior to cleaning; how badly they are damaged or bent; what preconditioning they received. It will be the individual's determination where this condition will exist. He will take into consideration cost of producing the product, cost of cleaning, percentage of cans being recovered, and resale value.

The mechanical cleaner used in Biloxi cleaned and derusted cans at a rate of 1,000 to 2,000 cases of 24 cans on each machine per 10-hour shift. The wide variation in production was due to differences in can sizes, the extent they were bent, and degree rusted. Badly rusted cans required longer processing.

Except for one unit of the Warner assembly, cleaning consists of running cans between a series of rotating brushes; the cans are sprayed with water under high pressure, and dried. The exception is an electro-cleaning unit that derusts cans using high amperages, low voltages, and chemicals. The principle is the opposite of electroplating.

A layout of the Warner machine follows. These machines will process all sizes that roll on edge, from 307/113 through one-gallon No. 12 cans. Processing large quantities will lower unit cost. This is good reason why canners outside the seafood industry--vegetable canners and others--who may have damaged stocks should also be considered when the idea of obtaining a machine is discussed.

Mechanical Cleaning Superior

Cans mechanically cleaned are superior to those done by hand. They are restored to almost new. Rust is removed or deactivated. Because the caustics and solutions are held at relatively high temperatures (180° F.), the cans are sanitized. Because the process removes all U.S. lacquers, and possibly some foreign, the cans are fogged during the final stages of processing with a protective coating of rust-preventive oil. Thereafter, they may be packed in new cases and held for observation.

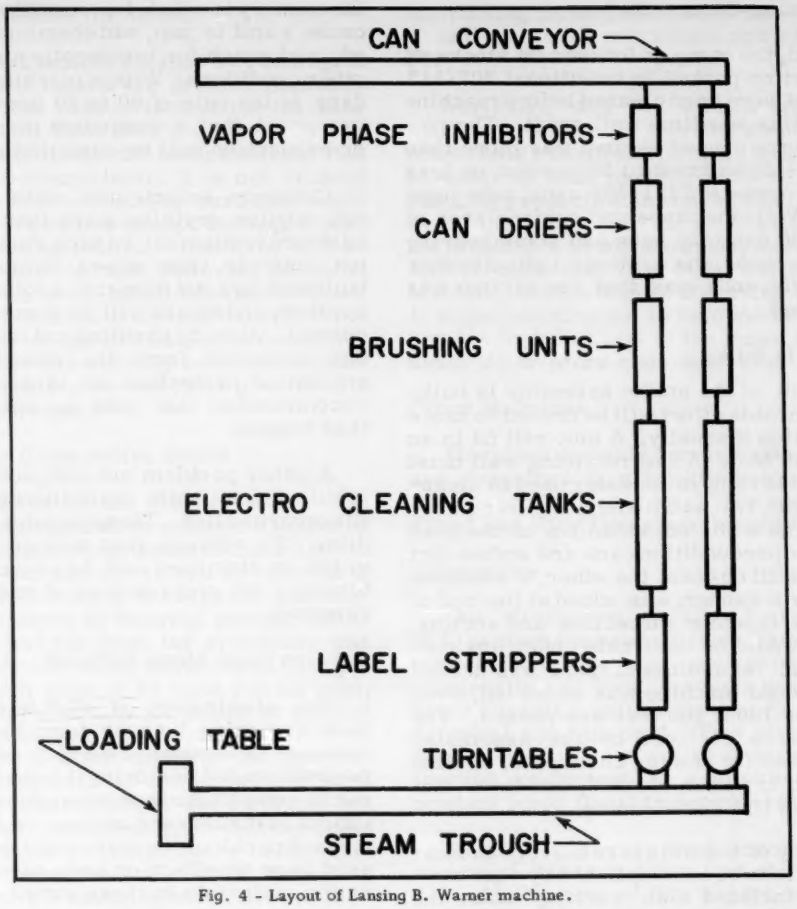

Fig. 4 - Layout of Lansing B. Warner machine.

2-Week Quarantine Period

It is imperative that ALL reconditioned cans be held at least two weeks (at 70-80° F.). During this time, defective cans will reveal themselves. After this quarantine period, each case should be inspected and "swells" removed because "swells" likely will become "leakers"--and the brine in which most seafoods are packed will spray other cans and cause them to rust rapidly.

Disadvantages of Mechanical Cleaner

There are some disadvantages or inconveniences in using a mechanical cleaner. Under most conditions, the machine will not be made available for quantities less than 20,000 cases, unless the user is insured by Lansing B. Warner, Inc. Based on fixed costs and cost of cleaning large quantities, it probably would be economically impractical for canner and machine owner to consider smaller quantities; but again this could vary where goods of high unit value are involved.

Arrangements to obtain a machine were made through Lansing B. Warner, Inc., 4210 Peterson Avenue, Chicago, Illinois 60646. Its representatives will wish to inspect damaged goods before confirming shipment, but this would protect the canner as much as the machine operators. Only then will one or more machines, stored in Greenwich, Ohio, be loaded on trucks and shipped. Assuming water and steam are available, a week is needed after the machine arrives to get it operable. This time-consuming procedure is frustrating when time is a prime factor. It emphasizes need to continue hand-cleaning operations while awaiting machine.

Hand Cleaning Canned Shrimp

In Biloxi, the canners focused on stocks of canned shrimp packed in traditional 307/113 cans. Most were hand cleaned before machine arrived. This was time well spent. The recovery rate on canned shrimp was more than 80 percent--in contrast to 50 percent or less for canned oysters in 211/300 cans, none hand cleaned. While the shape and surface area of the 211/300 can may have had some bearing on this difference, the evidence indicates that the big difference was that the shrimp was hand cleaned.

Assembly Is Bulky

Each unit of the entire assembly is bulky and considerable effort will be needed to move it into position manually. A unit will fit in an area 15 x 75 feet. A low retaining wall must be around it to contain the water used in cleaning. In Biloxi, two additional units were added. One was a 60-foot steambox at the head of the line to precondition cans and soften dirt and labels still on cans; the other, a conveyor supplied by a canner, was added at the end of the line to expedite inspection and sorting. The latter would be desirable under any circumstances. No additional space was needed when a second machine was added but, even so, an area 100 x 100 feet was needed. The U-shaped area enclosed by the assembled units was used for storing chemicals, holding stocks that had been cleaned, and those that were next in line for cleaning.

Assembly of the units is relatively uncomplicated and can be accomplished by four mechanically inclined men working under the supervision of a company technician. It would be advantageous, however, if one were a welder. Sixty hours were needed to assemble each machine in Biloxi; another 24 hours to get the units adjusted and the chemical portioned to achieve desired results. Most fittings required to customize the machine to a specific location can be obtained from a good hardware company. Operating under normal conditions, 1,000 pounds of chemicals are needed each 6 days. Although the chemicals are not unusual, they probably will have to be ordered from a fairly large city; delivery problems can develop.

2 Men Needed Nearby

After the units become operational, two mechanically competent men remained nearby at all times. One was the company technician, who had trained a helper supplied by the cannery to watch for conditions that would cause a unit to jam, add chemicals when needed, and watch for temperature variation and other conditions. With a machine processing cans at the rate of 60 to 80 per minute, it is important that a competent man be selected or production will be curtailed severely.

Company technicians state that cans do not require anything more than fogging with rust-preventive oil to stop rusting. This is not entirely true where humidity is high, buildings are not properly enclosed from the weather, and stocks will be stored longer than normal. Also, by handling and inspecting each can delivered from the machine, a small amount of protective oil is removed. It is recommended that cans be sprayed rather than fogged.

Another problem not completely resolved in Biloxi came while reconditioning cans with lithographed lids. These require special handling. To remove rust properly, the lithograph is disturbed and, to preserve the picturesque lid, some degree of rust will not be removed.

Foreign Cans More Difficult

The elimination of rust is dependent on first removing lacquer from the cans. The removal of lacquer from U.S. cans presents no problem, but removing it from foreign cans can be complicated and time consuming. Variations in tinplate and lacquer on foreign cans present problems because solutions normally used have no effect, or have adverse effects, on the materials in these cans.

In Biloxi, an attempt was made to clean about 3,500 cases of goods packed in cans from overseas, but the results were unsatisfactory. Without advance research to determine solutions and voltages necessary to produce a desirable finished product, attempts to derust cans from abroad in a Warner machine should be discouraged. It would be well even with U.S. cans. Because of the possibility of changes in the plate and lacquer, samples of cans to be cleaned should be analyzed by the machine operators to avoid last-minute disappointments.

With special equipment, lacquer can be replaced on reconditioned cans. It was considered at one point during the Biloxi cleanup, but was never attempted. The pros and cons are purely speculative.

Mechanical Cleaner in Action

When a mechanical cleaner is running, it will appear that losses are greater than they should be. The reason is that the machine reveals not only cans that are obviously defective--but also cans with hidden defects that will cause problems later. It is not unusual for a pinhole to be covered by rust that would be difficult to remove except through a machine's derusting action. Most cans will be 100 percent free of rust; however, an occasional can will have small amounts of rust, particularly in seams or around the lid. This should not be of great concern because any rust that is left has actually been lifted from the can and deactivated--another good reason for using a machine.

Community's Cooperative Spirit

The operation of the Warner machine in Biloxi was a cooperative venture sponsored by the American Shrimp Canners Association. Each canner was allowed to run 20 percent of his damaged inventory through the machine with lot determined by drawing straws. After each canner had his turn, the procedure was repeated. Initially, each canner was charged $1.30 for each case of 24 cans run through. This was determined by a counter at the end of the machine and would include defective cans discarded after passing the counter. This was recognized as a somewhat inflated cost. Each canner hoped to get a refund, but the refund was contingent upon shaving costs for materials, labor, and utilizing to best advantage the services of a BCF Marketing Specialist and 8 Technologists from the BCF Pascagoula Fisheries Station.

It is desirable to select persons who can perform best at every point of the operation. This is especially true at the beginning and end of the cleaning line. Those at the start can reduce costs by culling cans that are obviously defective, or those so badly bent that they would cause the machine to jam. Personnel who inspect cans coming from the machine are important. By eliminating a "leaker" or "swell" then, they will save all other good cans in a case that would be ruined by a "leaker" spraying brine later. The work performed by relatively unskilled workers in Biloxi cannot be discredited at this time by noting the greater percentage of defective cans in cases packed during the early weeks of the cleanup than later. This is evidence that more time should have been devoted to instructing loaders and packers on which cans should have been processed, and which packed.

Normally, only two women and one man will be needed at the starting point. A minimum of six women and one man will be needed to keep up with packing cans in cases and stacking products at the end of the line. However, the latter may vary. It will depend on the machine's production rate, number of defective cans that find their way through the machine, and the degree of sorting to be done. In Biloxi, sorting had to be done on 12 different products packed in the same type of can under 20 or more code numbers.

Other Machines

Machines suitable for salvaging purposes are described in a booklet published by the American Can Company: "Reconditioning of Flood and Fire Damaged Canned Goods."

Alternative

One alternative mentioned earlier would be to remove the product from damaged cans, repack it in new cans, and process it conventionally. If done, the cans would require some cleaning before the product could be removed and repacked. This alternative offers considerable promise if automatic can-opening equipment is available and if the product lends itself to reprocessing.

Another alternative deserves careful scrutiny. It is to sell damaged stock to a salvor. At the time of this report, no damaged canned goods in Biloxi were sold this way.

SUMMARY

Where large stocks are involved, a patented cleaner like the one used by Biloxi canners should be obtained with all haste, even though the stock is not rusted at the time the cans are first inspected. This feeling of the Biloxi canners is reflected by the number of cases of damaged goods returned to the market:

29,970 cases oysters in 211/300 cans
5,919 cases oysters and oyster stew in 311/300 cans
1,813 cases shrimp in 307/208 cans
54,162 cases shrimp and crabmeat in 307/113 cans

The initial cost of accomplishing this was $1.30 per case; in the end, the cost through refunds was $47\frac{1}{16}$¢ per case. Of the $123,239.90 collected to clean the cans, $78,965 was refunded.

BEFORE A HURRICANE

1. Develop a tentative plan for evacuation.
2. Keep posted on weather developments.
3. Commandeer labor and transport to expedite evacuation.

AFTER HURRICANE

1. Survey extent of damage to structure and merchandise.
2. Provide dry working area.
3. Collect damaged canned goods.
4. Remove labels from water-damaged cans.
5. Repack cans in dry cases.
6. Ascertain extent of damaged goods held by other canners.
7. Consider procurement of mechanical cleaner that also could be used by other canners.
8. Emphasize manual cleanup of cans when utilities are restored.

JUBILANT SHRIMPERS RETURN TO SEA AFTER CAMILLE TRAGEDY

James T. Wooten

An ancient mariners' ritual, honored by time and deepened by calamity, was repeated here today as a long line of shrimp boats chugged past a Roman Catholic priest for the blessings of the church.

"Stretch forth to them thy right hand, O Lord," he intoned while dozens of colorfully decorated vessels plowed out into the Gulf of Mexico to begin again a vocation crippled since last August when a hurricane nearly obliterated this once prosperous coastline.

Camille, the storm that took 144 lives and destroyed nearly a billion dollars worth of property, left behind a legacy of death and destruction that, after 10 months, still haunts those who survived its wrath.

It played no favorites. Plush resort inns where affluent whites came to play were flattened along with the squalid shacks where Negroes lived on welfare--and the shrimpers, predominantly of Slavic and French-Canadian origins, were almost destroyed by the 200-mile-an-hour winds that struck here Aug. 17.

A New Day

Their boats were damaged, and factories that processed and distributed the shrimp were destroyed. But today, beneath a searing sun and a nearly cloudless sky, the men whose livelihoods have long been dependent on the abundance and popularity of the small pink crustaceans proudly steered their new or repaired boats out to sea with a bright promise of a new day.

"Come forth your servants with a calm voyage and a safe harbor," the Rev. Morgan Kavanaugh prayed as the shrimpers and their awkward ships moved past his makeshift chancel on the stern of a boat called 'The Elmer Williams'.

In white vestments, and assisted by another priest and several altar boys, he sprinkled holy water on the churning waters of the gulf and prayed that the masters and all hands aboard the high-masted ships would be recalled "again to the happiness of country and home."

A native of Ireland, Father Kavanaugh offered his blessing in a brogue reminiscent of Barry Fitzgerald's and Pat O'Brien's cinematic roles as clerics. And the fishing community of Biloxi, a historic port city 90 miles west of New Orleans, responded with the abandoned merriment of a Mardi Gras celebration.

Dancing and Beer

Their jubilance, expressed by dancing in the streets to the music of a Dixieland band and the consumption of gallons of beer on board the ships and on the white sand beaches, marked an end to 293 days of frustration and despair borne of the storm's havoc.

In Biloxi alone, a predominantly Catholic city of 50,000 population, 16 persons were killed, stately old mansions were leveled, prosperous businessmen wiped out, nationally famous restaurants razed, lush green golf courses scarred, and the factories that gave economic meaning to the lives of the shrimpers destroyed.

In one evening of terror, a city whose reputation was based on the carefree élan of tourists and vacationers was brought to its knees by the fury of nature.

Even today, the hurricane's power is still evident up and down the 200-mile coast from Pass Christian, the hardest hit of the Mississippi Coast communities, to Mobile, where fringes of the storm battered that city and its people.

Mr. Wooten is a reporter for The New York Times. His report from Biloxi, Miss., appeared on June 8.

In Pass Christian, skeletons of homes and motels stand along the beachfront highway. There are lonely mail boxes, perched on bent standards, empty and without accompanying houses.

Bricks and Steel and Boats

Piles of bricks and twisted steel dot the beach along with pleasure boats washed ashore by the winds and the floods. At nearby Gulfport, in the confines of the Mississippi state docks, a huge tanker still rests heavily on the land as wrecking crews with torches and cranes take her apart piece by piece for salvage.

Near Biloxi, two stone mastiffs stand guard against intruders over a slab of concrete that once was the foundation for an expensive house, and the giant, ageless oak trees that once formed a leafy tunnel for cars traveling along the beach are bent and twisted and bare.

There are hulks of cars and trucks rusting in the salt breezes from the Gulf--and there is, among some of those whose lives were disrupted by the winds, a certain bitterness toward the government agency that moved in to alleviate the suffering.

The State of Mississippi, for instance, only last month gave its final approval to a $10.5-million appropriation for coastal areas hit by the storm. Until then, only $500,000 had actually reached the disaster area.

The Federal Government, working through the Army Corps of Engineers, the Small Business Administration and other agencies, has, in the opinion of many residents, failed to keep the President's commitment to restore this area.

Red Tape Delays

At every level of the bureaucracy, there are red tape delays, structural impediments and official interference with the progress of renewal, local residents believe.

But all that was behind Biloxi today.

The ships' flags applauded in the breeze, their horns blasted with deafening enthusiasm, and the ruddy, hardy shrimpers laughed and swigged their beer and forgot about yesterday.

"The blessing of the fleet takes on an added importance and deeper meaning and significance because of the storm," Father Kavanaugh told those who attended an early mass today at St. Michael's, the church where he and his associate, the Rev. George Murphy, also an Irish native, spent the night of Camille clinging desperately to statues of the Virgin Mary and St. Joseph.

Those who heard him understood him. Their city had waited 10 months for a symbol of resurgence and the old tradition of the shrimp fleet blessing was enough.

"We cannot afford the luxury of self-pity," the priest said. "God in his goodness has seen fit to leave us here on this earth. You have your boats, your health and you have your families to support, so let's get on with the business of living with a deeper faith and trust in God."

SEASONAL AND GEOGRAPHIC CHARACTERISTICS OF FISHERY RESOURCES

California Current Region--III. Pacific Hake

David Kramer and Paul E. Smith

This third report of a series (Kramer and Smith, 1970a, b) describes the characteristics of the resource of the Pacific hake (Merluccius productus). It emphasizes predictions of the time and localities of adult spawning and suggests the potential for production of the resource.

The data of the California Cooperative Oceanic Fisheries Investigations (CalCOFI) for hake larvae (summarized for the decade 1951-60[1]) indicate that the major center of spawning (50 percent or greater occurrence of larvae taken in standard plankton tows) appear first in December in a small area just south of Point Conception (fig. 1). In January and February, the major centers extend from Point Conception to Magdelena Bay in a widening band, not delimited in their southernmost extent. In March and April, the last months of peak spawning in the CalCOFI pattern, the centers spread offshore and northward until they extend outside the survey pattern except off central Baja California.

The Pacific hake is variously distributed from the Gulf of California (Starks and Morris, 1907) to Alaska (Clemens and Wilby, 1961). A number of investigations of seasonal and annual distributions have led to the hypothesis that adult hake are migratory (Alverson and Larkins, 1969; Nelson and Larkins, 1970). These reports hypothesized that the fish migrate southward in late fall and winter to spawn from central California to southern Baja California--and migrate north in late spring, summer, and fall to concentrate chiefly in inshore waters from California to northwest Washington (fig. 2).

It is in the latter season, and in those locations, that the fisheries must limit themselves because, as stated by Nelson and Larkins (1970), attempts to locate spawning hake in commercial quantities usually have met with little success. They attributed this, for the most part, to insufficient knowledge of the behavior and dispersion of hake during spawning. They stated further that all present data indicate that, in winter and early spring, spawning adult hake were located beyond the continental shelf off California and Baja California. This fact was reflected particularly in the relative scarcity of hake landings in the California animal food fishery and the absence of hake from December to April in the Vancouver Island-Oregon region. The latter corroborates, in part, the hypothesis of migration cited above.

In November 1969, a meeting of fisheries specialists of the U.S. and the U.S.S.R. was held in Seattle, Washington, to discuss the status of fish stocks of mutual interest. Preliminary estimates of the size of the hake stocks were as follows:

1. U.S.S.R. estimate from hydroacoustic surveys for all hake in the area between 37° N. and 52° N.--1,200,000 metric tons.[2]

2. U.S. estimate from hydroacoustic surveys for all hake in the area between 44°40' N. and 49°12' N.--283,000 metric tons.[3]

The authors are Fishery Biologists, BCF Fishery-Oceanography Center, La Jolla, Calif.

[1] Organizations, area of investigation and treatment of the data were presented by Kramer and Smith (1970a).

[2] Verbal information only. Cited in the Report of the meeting of fisheries specialists of the United States of America and the Union of Soviet Socialist Republics concerning the status of fish stocks of mutual interest in the northeast Pacific Ocean, and on plans for joint and coordinated research of their biology, held in Seattle, November 17 to 22, 1969 (mimeo. report--copies available from BCF Biological Laboratory, Seattle, Wash. 98102).

[3] Smith, Paul E. 1969. Calculations of hake spawning biomass from egg and larva surveys, 1951-69. In Spawning Biomass of Pacific Hake, 1969 (Report on Cooperative USA/USSR Hake and Larva Surveys, 1969), compiled by Staff, Fishery-Oceanography Center, BCF, La Jolla, Calif., pp. 6-41 (mimeo. report).

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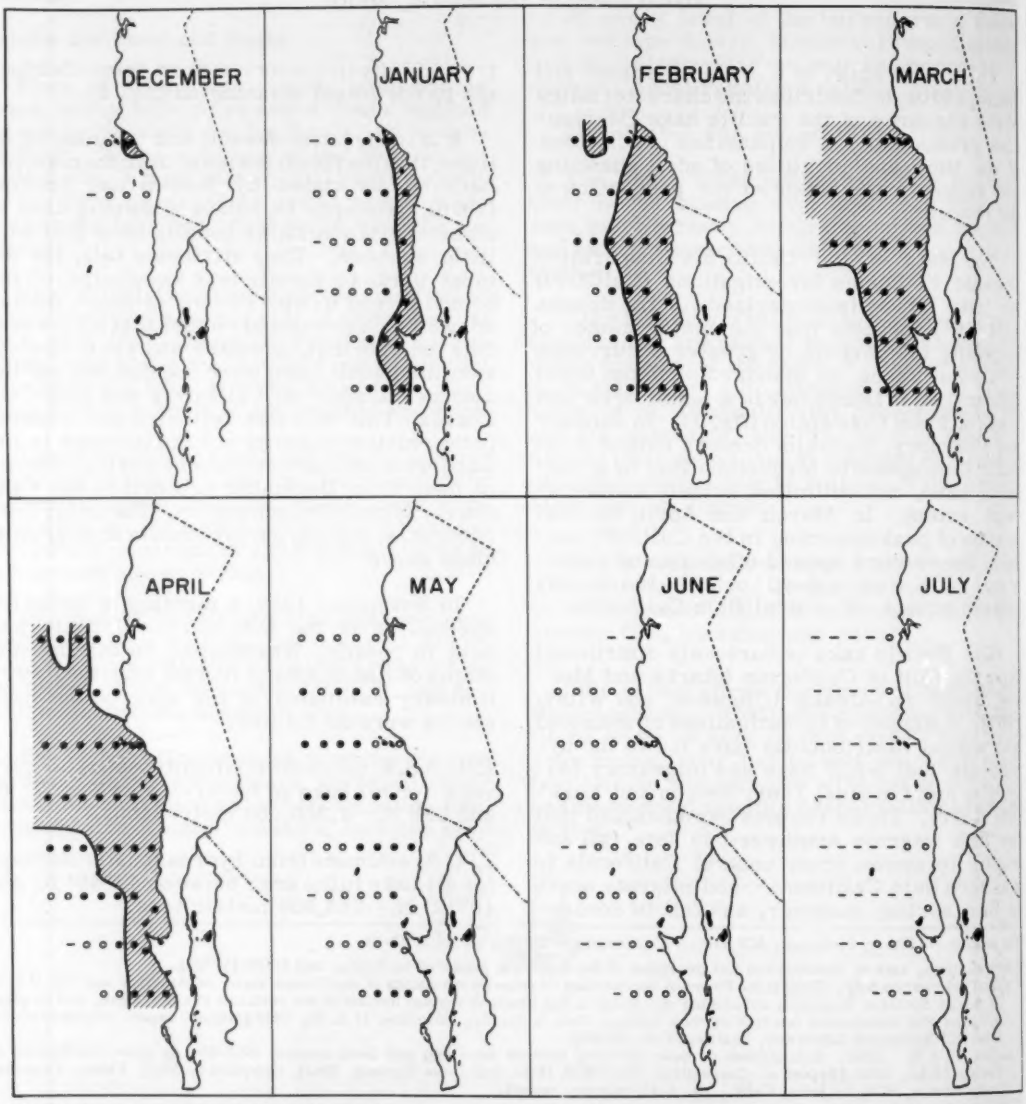

Fig. 1 - Percent occurrences of hake larvae, from summarized data for 1951-60, on the survey pattern of the California Cooperative Oceanic Fisheries Investigations (CalCOFI). Each line, circle or dot represents a pooled statistical area (see text footnote 2). (o) - equal to or less than 25 percent occurrence; (●) - greater than 25 percent occurrence; shaded area - greater than 50 percent occurrence; (-) - area occupied with no occurrences.

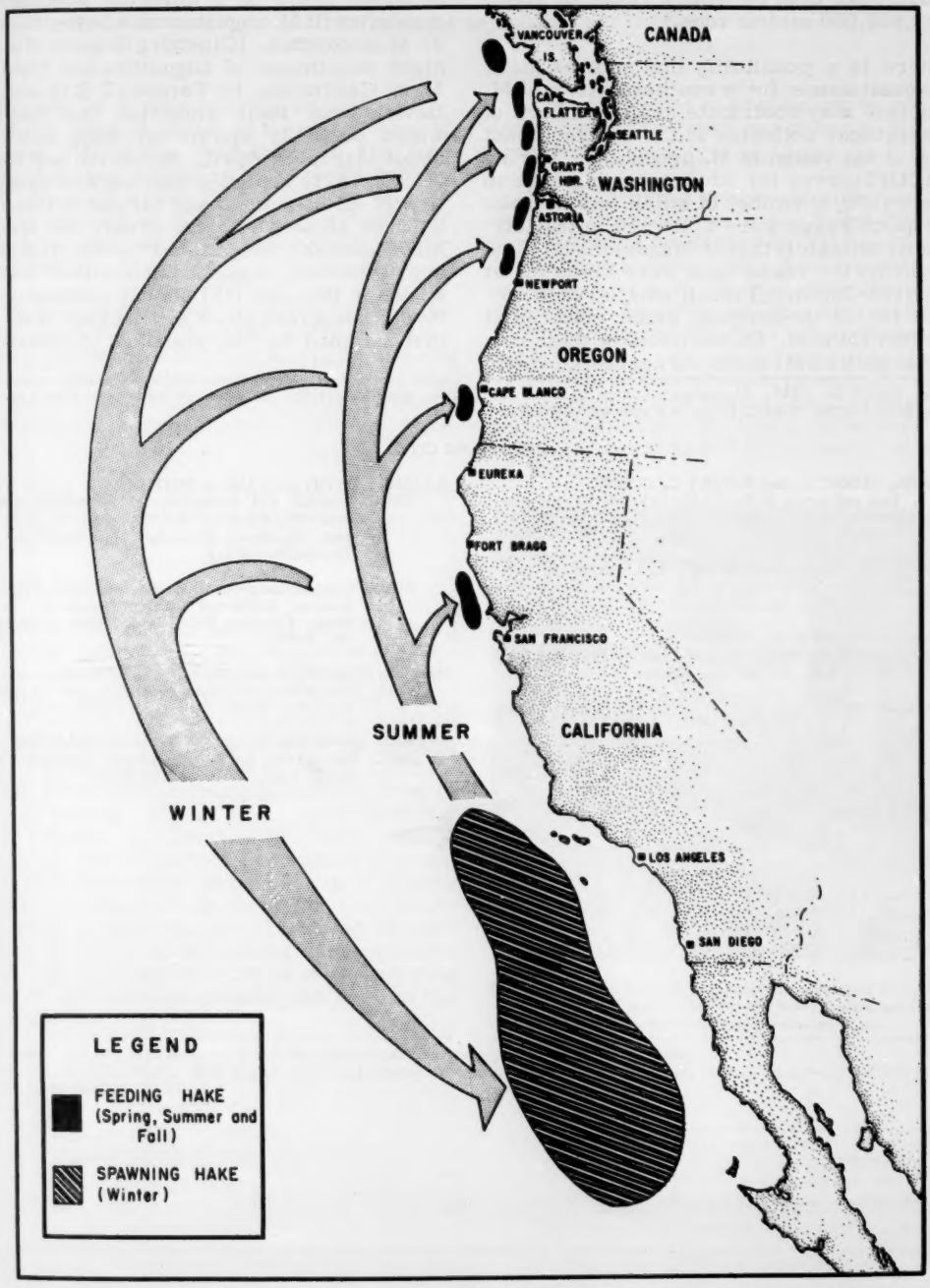

Fig. 2 - Seasonal migration and distribution of Pacific hake (fig. 6 of Alverson and Larkins, 1969).

3. U.S. estimate from egg and larvae surveys for adult hake over the entire range of species--2,630,000 metric tons.[4]

There is a possibility that another hake, M. angustimanus (or a southern stock of M. productus) may contribute some numbers of larvae to those collected in the southernmost extent of the range of M. productus. During a CalCOFI survey for adult spawning hake in January 1970, a number of small female hake with ripening eggs were collected in the latitude approximately that of Magdelena Bay and just north of it. These hake were maturing at sizes (126-202 mm.) much smaller than expected for M. productus, which matures at about 400-450 mm. On the basis of their maturity at such small sizes and certain meristic characters, it is believed that these are a separate stock or a different species--the meristics fit M. angustimanus better than they do M. productus. (Ginsburg described in 1954 eight specimens of angustimanus from Del Mar, California, to Panama.) It is also believed from their condition that this hake would probably spawn off Baja California about March or April. Ahlstrom and Counts (1955, p. 329) reported that careful examination of all hake eggs and larvae in their collections showed evidence of only one species, M. productus. They stated further that, from such evidence, angustimanus either does not spawn in the CalCOFI survey pattern or that its spawning take place at a deeper level than that sampled by the standard plankton haul.

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HERRING ROE: Alaska's Fast-Growing Specialty Food Industry

Jerrold M. Olson

The use of Alaska herring as a commercial food product dates to the early days of the new Territory. Beginning in the late 1800s, herring salteries were built rapidly along Alaska's coast; by 1928, more than 70 were in operation. The annual production of salt-cured herring peaked in 1922 at 36 million pounds.

Because of poor market conditions in the 1930s, production declined from a high of 13.3 million pounds in 1933 to 3.4 million pounds in 1939. The decline continued during the next decade; by 1947, only 2 million pounds of salt-cured herring worth $280,000 were packed.

In 1950, when production had dropped to 264,000 pounds, valued at $42,000, the salted herring industry went out of existence.

Interest Reborn

Interest in Alaska herring as a food was revived in 1964 to meet the demand of a Japanese market for a new kind of specialty product--salt-cured herring roe. In that year, 23,000 pounds of roe were produced for export to Japan. The product sold for as high as $7 a pound on the Japanese retail market. In 1965, production increased fivefold. Nearly 200,000 pounds of roe worth over $300,000 were shipped to Japan. By 1968, almost 300,000 pounds of herring roe valued at more than $500,000 were produced in 7 Alaska processing plants.[1/] In that year, the wholesale value of this specialty food was 82 percent of the value of all Alaska herring products--although only 40 percent of the herring catch of 8.1 million pounds was used in the roe industry.

The steps used in processing herring roe for shipment to Japan are shown in figures 1 through 9.

Note: Herring roe production reportedly is "big" this season in the Kenai Peninsula area. About 1,500 tons of herring were caught in Kachemak Bay and Resurrection Bay; processors in Seward and Homer are swamped. Herring roe is being processed in Anchorage for the first time. Some of the larger plants are employing more than 90 employes in this presalmon-season venture. For Alaskans, this fishery has been increasingly profitable. In 1969, fishermen were making as much as $10,000 a vessel at prices of $40 a ton.

Fig. 1 - Herring used in roe processing are aged in an open-top tank for 5 to 7 days. Herring are being transferred from aging tank to containers for transfer to processing plant.

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1/Richard C. Nelson. 1970. 1968 Alaska catch and production commercial fisheries statistics. Alaska Department of Fish and Game, Statistical Leaflet 17, 29 pp.

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Fig. 2 - Herring roe is removed from the "aged" herring by first breaking the fish just behind the head, then using a squeeze-shake action to extract the roe from the carcass (woman on left). The ripeness of fish when caught is critical because seasonal maturity greatly influences both processing efficiency in removing roe and final quality of roe product. The amount of roe recovered from amount of herring landed is 8% to 10% by weight.

Fig. 3 - "Gibbers"--women who remove the herring roe--work on a piecemeal basis. In this Sitka, Alaska, processing plant, they earn $28 to $45 a day.

Fig. 4 - Basket of herring roe is put into a brine solution. During processing, roe is placed for 12 hours in each of three different brine solutions with a 3- to 6-hour drain period between each soak. The first two solutions have a salt content equivalent to sea water, the last a 100% solution of salt.

Fig. 5 - A Japanese technician looks on as worker carefully places basket of herring roe in final 100% brine solution. In background, herring roe in mesh baskets go through a 3- to 6-hour drain period.

Fig. 6 - Broken and discolored skeins of herring roe are removed during final inspection.

Fig. 7 - Herring roe in baskets are weighed before they are packed in cartons.

Fig. 8 - Cured herring roe is packed in plastic-lined, heavy-duty cartons for shipment to Japan. Each carton holds 120 pounds of herring and 18 pounds of dry salt.

Fig. 9 - Herring roe, a delicacy in Japan, sometimes brings $7 a pound retail.

INTERNATIONAL

BREAKTHROUGH IN MIDWATER TRAWLING REPORTED AT FAO MEETING

Giant trawl nets half the size of a football field are being used successfully in the North Atlantic fisheries following the breakthrough in midwater-trawling in recent years.

The nets are aimed at the fish through the use of echo sounders, sonar and netsonde. Now FAO is testing the effectiveness of the nets in other parts of the world and for different fish species as part of its fishery development projects in developing countries. The nets already have yielded impressive catches of hake and anchovy in demonstration fishing in Peru and Argentina.

Began in Early 1950s

Commercial midwater trawling dates to the early 1950s. A Danish netmaker invented the Atom trawl, a "pair trawl" towed by two boats. It proved effective for catching herring in the winter when the fish are sluggish. During the next 10 years, attempts at one-boat midwater trawling had limited success, except under particularly favorable conditions.

Giant Net at Low Speed

In those early experiments, attempts were made to tow a small trawl at high speeds, but active fish were difficult to overtake as they escaped around the edges of the net's mouth. A breakthrough came only about 4 years ago, when a different approach was tried: a giant net was towed at very low speed. These nets have a mouth area up to 20,000 sq. ft. They are now used successfully in the West German fishery for herring, cod, coalfish, and redfish in the North Atlantic. This was reported to FAO Technical Conference on Fish Finding, Purse Seining and Aimed Trawling, Reykjavik, Iceland, May 24-30.

ACTIVE TUNA FISHING IN SOUTHERN INDIAN OCEAN

For 5 years, the Japanese trading firm Toshoku, jointly with Daien Reizo, has been buying tuna off the Malagasy Republic's east coast. Supported by a strong export market, business reportedly has been good.

At first, 4 or 5 reefers (7,800 tons each) were used; 5,000 metric tons of tuna were purchased per year. In January 1969, Daien Reizo bought the 'Eijin Maru' (8,000 tons) from Taiyo Gyogyo. Since then, the vessel has been used as a floating cold storage. In 1969, 20,000 tons of tuna were bought.

60 Vessels Fishing

At present, about 60 vessels (Korea 30, Taiwan 20, Okinawa 5 or 6, and Japan 4 or 5) are fishing off east Africa year-round under 2-year contract with Toshoku: albacore off Malagasy, Capetown, and Durban; yellowfin off Monbasa and Colombo.

20,000 Tons in 1969

The 20,000-ton catch in 1969 is reportedly less than in 1968. Catches for 1970 are estimated at 25,000 tons. Since tuna export market is at its highest, forecast is good for purchase of tuna off east Africa and Malagasy.

Off Capetown & Durban

The albacore season off Capetown and Durban will continue until August. Each vessel will take a maximum of 2 to 3 tons per day during the 7- to 16-day fishing trip. It is reported that a catch of 2 tons per day for foreign vessels will pay.

The yellowfin season will begin in September.

Seller's Markets

Informed sources believe supply will not meet the demand because present exports are in a seller's market in U.S. and Italy. Export price is as high as US$680 a short ton for albacore to the U.S., and $640 a metric ton for yellowfin to Italy.

About 70% of tuna taken off eastern Africa and Malagasy is being exported through Toshoku to U.S. and Italy. Therefore, Toshoku appears well established. ('Minato Shumbun,' Apr. 7.)

JAPAN & INDONESIA EXTEND FISHERY AGREEMENT

The private fishery agreement between Japan and Indonesia was extended in Djakarta on May 21. It runs to July 26, 1972. The pact can be extended automatically for another year if requested by Japan and Okinawa.

Identical Provisions

The new agreement continues the old provisions: (1) Japanese and Okinawan tuna long-line vessel owners, operating out of Ambon Island, will pay Indonesia an annual harbor fee according to vessel size: US$300 if under 70 gross tons; $390 if over 70 tons. (2) No more than 250 Japanese and 60 Okinawan vessels are permitted to operate annually. (3) Annual fish catches are not to exceed 15,000 metric tons for Japan, and 4,500 tons for Okinawa; their vessels are to operate in Banda and Ambon Island and other specified areas.

Speedy Settlement This Year

The speedy settlement is attributed to the agreement on extending monetary credit to Indonesia under Japan's economic assistance program. In 1967, Japan extended credit limit of $50 million; in 1968, $110 million; in 1969, $120 million.

This year, the Indonesians requested $140 million. Japanese agreed under condition that $5 million of it would be used to promote Indonesia's fisheries based on extension of bilateral fishery agreement. Then negotiations progressed rapidly. ('Suisan Tsushin', May 23.)

ICELAND AND SOVIET UNION SIGN TRADE AGREEMENT

The annual trade agreement between Iceland and the USSR was signed at the end of Jan. 1970. The value was US$8 million at prices slightly higher than before.

Iceland will export to the USSR 13,000 metric tons of frozen fish fillets--9,500 tons will be redfish (ocean perch) and saithe, and 500-1,000 tons Greenland halibut (turbot).

Export Totals

Iceland also will export 6,000 tons of whole frozen fish and 4,000 tons of frozen herring. Quantities are almost the same as in 1969, except for increase of 2,000 tons of whole frozen fish. ('Atlantica and Iceland Review', June 1970.)

CUBANS ATTEND PERU'S INTERNATIONAL FISHING FAIR

Cuban fishery officials headed by the director of the National Fishing Institute visited the International Fishing Fair in Lima, Peru, in early April 1970. They were interested primarily in studying Peruvian fish-meal processing techniques and new developments in plastic-hulled fishing vessels.

The Cubans conferred with Peru's Fisheries Minister, and visited El Callao port to watch unloading and processing of fish meal. They also fished for anchovies.

Cuba's Fish Meal Interest

The Cubans have become interested in fish meal only recently: their production in 1968 was 1,300 metric tons. In 1970, production goal is 20,000 tons; this parallels the rise in fishery catches.

The introduction of plastic-hulled vessels would be new to Cuba's shipbuilding industry.

Cuba's Efforts Praised

Peru's Fisheries Minister praised Cuban efforts to increase catch from annual 20,000 tons to 170,000 tons.

GOOD PINK-SALMON CATCHES IN N. PACIFIC

The catch of pink salmon by Japan and the Soviet Union was extremely good in 1969, the highest since 1964. It tends to support Japanese position that stocks have been recovering since 1964.

Species	Japan			U.S.S.R.		
	1967	1968	1969	1967	1968	1969
	(Metric tons)					
Sockeye	20,493	16,766	15,502	3,018	2,249	1,640
Chum	51,630	42,519	30,171	20,639	13,697	5,867
Pink	64,481	42,787	69,520	50,701	16,253	63,436
Other	4,904	7,039	11,127	4,523	3,992	4,525
TOTAL	141,508	109,111	126,320	78,881	36,191	75,468

JAPANESE EX-DETAINEES ON SAKHALIN IS. DESCRIBE SOVIET TREATMENT

Three Japanese fishermen were released recently from detention on Sakhalin Island for violating Soviet-claimed territorial waters (12 miles off Kuril Islands). They described conditions in work camps to the Liberal Democratic Party newspaper 'Jiyu Shimbun'.

Extremely cold weather and forced labor in quarries made life miserable for all, they said. They had to work outside in temperatures as low as -30° C. (-22° F.), often in snowstorms, until work quotas were filled. (Exceptions were persons with "medical certificates.") Particularly offensive to the Japanese was that the old fishermen were not excused. Lack of proper heating in rooms made sleep impossible; serious illness was prevalent.

Some Fishermen Seized Before

One fisherman said he and his vessel had been seized 3 times. Another detainee cited cases of Japanese fishermen seized 5, 8, and 13 times. In past 20 years, 11,000 fishermen and 1,300 vessels have been captured for fishing within 12 miles of some northern islands.

Seizure Costly

Cost of being seized is high in human and in economic terms. A new 30-ton coastal fishing vessel costs 20 million yen ($555,400); used vessels cost 4-5 million yen ($111,000-138,850). The Soviets have kept over one-third of all vessels seized. They sent those they did not want to North Korea.

Danger in Seizures

There is much danger in the actual seizure, the fishermen said. Soviet patrol boats fire flares directly at Japanese vessels to stop them.

The fishermen emphasized that, despite the dangers in fishing those waters, they will continue to do so because they consider the islands part of Japan. They felt their release under amnesty was political.

LARGE CAPELIN STOCKS REPORTED OFF LABRADOR AND NEWFOUNDLAND

Norwegian fishery scientists report large stocks of capelin off Labrador, Newfoundland, and in the Davis Strait. Research vessels have discovered the capelin widespread and available for a new commercial fishery for fish meal.

Factoryship May Be Sent

Norwegian vessels are not able to preserve catch adequately for transport to home plants. A new factoryship may be sent to produce fish meal on the grounds. Application has been filed for authority and funds to conduct such an operation, possibly this fall, with mothership and fleet. (U.S. Embassy, Copenhagen, June 12.)

JAPAN RATIFIES S.E. ATLANTIC FISHERY CONVENTION

On June 22, Japan became the first nation to ratify a convention for preserving resources of the South East Atlantic threatened by overfishing. The convention will become effective 30 days after formal acceptance by 4 states--provided their combined catch amounts to at least 700,000 metric tons.

7 Convention Signers

Japan was one of 7 signers of the Convention drawn up in Rome in October 1969 at a meeting of nations that fish off Africa's South West coast. Other signers were Cuba, the Federal Republic of Germany, Italy, Portugal, the Republic of South Africa, and Spain.

FAO called the October 1969 conference after experts found that the South East Atlantic was in danger of being overfished. Main catches there are hake and pilchard.

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SOVIET-JAPANESE FISHERY NEGOTIATIONS

The 14th annual meeting of USSR-Japanese Northwest Pacific Fisheries Commission, in Moscow, ended on April 30 after 59 days of negotiation. The two agreed on 1970 Pacific salmon catch quotas and on regulating Japanese herring fishery in Okhotsk and Bering Seas. The meeting overlapped crab negotiations.

Japan's Crab Catch Cut 10%

Japan's 1970 catch quota for all crab species was reduced 10% from 1969. However, sharpest reductions applied to areas off West Kamchatka, where king-crab quota was reduced 15.3% (from 216,000 cases in 1969) and off Cape Oliutorskii (West Bering Sea) where tanner-crab quota was cut 14.5% (from 13 million crabs in 1969). Tanner crab quota also was reduced 10.5% off East Sakhalin (from 19 million crabs in 1969).

Vessel Number Almost Unchanged

Number of Japanese vessels allowed to fish remains essentially unchanged: 4 king crab and 2 'Ibaragani' crab fleets will operate off West Kamchatka; 42 vessels in West Bering Sea (no more than 21 at one time); 6 vessels off East Sakhalin for blue crab and 39 vessels for tanner crab; 14 vessels in Nijoiwa area; and 37 vessels in "triangle area."

Soviets Set New Boundaries

Soviets established new fishing ground boundaries: northern limit of 'Ibaragani' crab fishing grounds off West Kamchatka at 56° N. (56.2° N. in 1969), and western limit of tanner crab fishing grounds off Cape Oliutorskii at 168° E.

Salmon

According to Japanese press, 1970 Japanese catch quota of 90,000 metric tons is lowest since Soviet-Japanese Fisheries Treaty in 1956; it is about 15% below 1969 (105,000 tons).

Fishing Zones for Japan

The Japanese agreed to 2 "no-fishing zones" off Southeast Kamchatka: in one, salmon fishing was banned between May 15 and June 19. Fishing season in zone A (N. of 45° N., where Japanese operate high-seas salmon fishery with motherships and catcher vessels) will end Aug. 10, as in 1969.

Soviet Salmon Catch

Japanese newspapers report Soviets have set their 1970 coastal salmon catch target at 40,000 tons. In 1969, it was 80,000; in 1968, 60,000. Soviets do not catch salmon on high seas. They have cut Japanese mothership catch from 54,000 tons in 1960 to 45,000 tons in 1970.

Soviet & Japanese Pacific Salmon Catches

	Japan		USSR	
	Quota	Catch	Plan	Catch
	(in metric tons)			
1970	90,000	n.a.	40,000	n.a.
1969	105,000	109,757	80,000	75,468
1968	93,000	92,012	60,000	36,191

Negotiations

Japanese salmon catch quota is set each year by negotiations of Soviet-Japanese Fisheries Commission. These usually begin in March and last until April, when Japanese coastal salmon fishery begins. The Japanese are forced to agree to Soviet terms or lose fishing time.

The fishery is divided by treaty into 2 zones: north of 45° N. (Zone A) and south of 45° N. (Zone B). Japanese salmon fishery in the latter is entirely coastal. Negotiations are purely a political exercise without scientific basis, except beginning of talks (usually first 2 weeks) when a joint scientific committee discusses expected salmon run and tries to determine catch quota. In 1970, scientists were so divided on size of run, they were unable to submit joint report to Commission.

Artificial Salmon Breeding

Japan and USSR have agreed to confer about artificial salmon breeding. Prior to negotiations, Soviets proposed a joint artificial spawning and incubation project to increase salmon resources of North Pacific. According to Japanese, this was revival of a past proposal by them but ignored by Soviets. The project would involve suitable estuaries of Soviet rivers where salmon hatcheries could be built.

The Japanese Fisheries Agency is ready to cooperate fully with project and provide funds for hatcheries, materials, and equipment. Japan will proceed with studies of artificial salmon incubation in rivers of Soviet Far East.

Herring

Herring fishing was prohibited off Karagin Island (Bering Sea off North Kamchatka) and in Shelikhov Bay (Northwest Sea of Okhotsk) between May 1 and 15. Number of Japanese herring vessels in those 2 areas will be cut: off Karagin Island to 5 (98 in 1969), and in Shelikhov Bay to 3-5 (67 in 1969). Beginning in 1971, it was agreed to prohibit taking herring smaller than 22 centimeters in fishing grounds north of Hokkaido.

Agreement Is Compromise

The herring agreement is a compromise on original Soviet request to: (1) completely ban herring fishery off Karagin Island until resource is restored; (2) ban herring fishery off Kuril Islands, Hokkaido, and in entire Sea of Ikhotsk for 3 years beginning in 1970; and (3) close Shelikhov Bay herring fishery at specific periods.

Reportedly, Soviets in 1969 had closed Korfo-Karagin area (North Kamchatka) and Sea of Okhotsk to their herring fleets because of depleted herring resource. Since a further decrease in herring was recorded, they blamed Japanese, who rejected the accusation on grounds that: (1) there is not sufficient scientific evidence for Soviet claim of depleted herring stocks, and (2) Japanese herring fishery was conducted under terms of 1969 agreement. (Japanese press, U.S. Embassy, Tokyo, Apr. 8; TASS, Apr. 30.)

POLAND BUILDS TRAWLER FOR HIGH-SEAS RESEARCH PROJECT

Poland is building a computerized research trawler in the Gdansk shipyard for an FAO-aided fishery development project. The 300-ton vessel, scheduled for launching in October, is the major Polish contribution to the $13,395,000 project. FAO is providing the computer and other sophisticated navigational and fish-finding aids at a cost of US$1.2 million. The project involves the exploitation and conservation of high-seas fishery resources in the tropical mid-Atlantic, and fishery training for developing countries.

The Vessel

The 294-foot, 2400-HP diesel-electric single-screw vessel will have computer and laboratory facilities, and accommodations for 45 crew members, 29 scientists, and 11 trainees. She will be able to use 5 types of trawls, including standard cod trawl, high-opening bottom trawl, deep-water and midwater trawls. She will carry two 36-foot work boats for purse seining, bottom set gillnetting, shrimp trawling, and for general use.

Fish-finding equipment will include survey sonar, search-light sonar, three scientific sounders, precision depth recorder, and echo integrators.

Computer and Lab

The computer will be interfaced with sophisticated navigational aids. It will be used for fishery research, making improved fishing charts, and for research on trawl gear and quick answers to problems of midwater trawling. Also, it will be used eventually for rapid processing of catch data from commercial vessels, and to develop understanding of problems in tactical control of high-seas fishing fleets.

The extensive laboratory facilities will include a hydro-acoustic cabin, located on bridge; hydrographic, benthic, and plankton working stations and laboratories; facilities for fishing-gear analysis and advanced fish studies, and for fish processing. A large fish-meal plant, 35-ton daily capacity of whole fish is being installed.

TO STUDY SOVIET & JAPANESE SALMON & HERRING CATCHES OFF B.C.

Canada's federal fisheries department plans to outfit a research vessel with special gear to study catches of Soviet and Japanese fleets off British Columbia. The C$1.8 million 'G. B. Reed' of Victoria will be equipped with gear for bottom fishing similar to Soviet gear. Her crew will try to establish whether the Soviets and Japanese are depleting salmon stocks.

Disagreement Over Fishing

The foreign fleets maintain they are only after bottomfish (hake and ocean perch); but the 33,000-member Pacific Trollers' Association says they also are landing salmon and herring, upon which salmon feed.

Despite department assurances, the Trollers' Association is far from convinced that the foreign dragger fleets are only catching salmon and herring incidentally.

Worst Year Since 1960

The fisheries director said the G. B. Reed's mission is to determine the size of this incidental catch in "another one of our steps to give the Canadian industry the best protection possible."

The Trollers' Association blames the foreign fleets at least in part for last year's poor salmon run. The total catch was 78,900,000 pounds worth C$27.6 million, only 45% of 1968 catch and the worst year since 1960.

NEW RAW-FISH SUPPLIES FOR MEAL SOUGHT OFF NEWFOUNDLAND

The need of Canada's Atlantic coast fish-meal industry for large quantities of alternatives to herring has resulted in a widespread search for capelin and sand launce. The federal Department of Fisheries and Forestry is exploring inshore and offshore waters south and east of Newfoundland for those species.

The growing importance of herring for human consumption necessitates finding large supplies of suitable substitutes as mainstay of Atlantic coast fish-meal industry.

Chartered Vessel

From early June through September, the chartered 100-foot midwater trawler 'Lady Anna,' out of Saulnierville, N.S., will survey the Burgeo, St. Pierre, and Grand Banks before moving north to Trinity, Bonavista, Notre Dame, Green and White Bays.

A midwater trawl will be used because it is more versatile and less vulnerable to damage over unknown grounds than conventional purse seine.

Herring Information Too

Although large stocks of capelin and sand launce are main objects, the survey also is expected to provide fishermen with information about size and location of herring stocks. (Canadian Dept. of Fisheries and Forestry, June 9.)

EUROPE

NORWAY

SAITHE SALES TO EAST EUROPE WILL SET RECORD

Norway's sales of deep-frozen saithe fillets to COMECON will total a record 20,000 metric tons in 1970. COMECON is the "Common Market" of Communist East Europe.

The Soviet Union is back as a big buyer. Her purchases had declined in the last few years. She will purchase 10,000 tons in 1970; the remaining 10,000 tons will go to other COMECON countries.

Norway's Saithe Sales

The large Soviet purchase is not affecting her purchases from other areas, mainly Iceland and Britain. Norway's increased sales to the Soviet Union are not expected to affect adversely sales to more stable markets, such as Czechoslovakia and Hungary. Deliveries to the U.S., Western Europe, and other markets are based on cod, haddock, and other white fish--not on saithe. The Norwegians would like to change this. ('Export Council of Norway')

Soviet Saithe Catches Drop

Soviet catches of saithe decreased from 33,800 metric tons in 1966 to 11,900 tons in 1968; this is most likely reason for increased purchases abroad.

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SALMON CATCH DECLINED IN 1969

The 1969 salmon catch in Norwegian rivers and within the 12-mile fishing limit was 1,468 metric tons: 1,248 tons within the 12-mile limit and 220 tons in rivers. This compares with the 1968 catch of 1,593 tons: 1,318 tons in the sea and 275 tons in rivers. The river catch was down 55 tons from 1968.

Catch Tripled in Int'l Waters

Norway's Statistical Bureau estimates that Norwegian fishermen caught 440 tons of salmon in international water off the coast--more than triple the 1968 catch of 130 tons.

Off Greenland

Norwegian fishermen took an estimated 250 tons of salmon off Greenland in 1969 (135 tons in 1968). The estimated expressed catch value within 12-mile limit and in international waters was more than US$3 million; this excludes rivers. In 1968, it was about $2.95 million. River rental and fishing permits in 1969 totaled $53,000.

Sea Trout & Sea Char Included

The catch data may change somewhat--but not significantly. It is Norwegian practice to include with salmon catch data on sea trout and sea char. Weight is given in round fish, heads on and not gutted. (U.S. Embassy, Oslo, May 16.)

ICELAND

STRIKE SETTLEMENT RAISES FISH-PROCESSING COSTS

The strike by unskilled workers in Iceland was settled on June 18. The settlement provides for a general 15% base wage increase, and an 18.3% base wage increase for fish-processing workers.

Other union demands also were met. Estimates are that the settlement will cost most industries about 20% in increased expenses, but somewhat more in the fish-processing industry.

The new contract is scheduled to run 17 months, or until Oct. 1, 1971. (U.S. Embassy, Reykjavik, June 19.)

UNITED KINGDOM

SCOTLAND TO DELIVER 6 TRAWLERS TO S. AFRICA

An Aberdeen (Scotland) shipyard has delivered the M/S 'Protea' to Irvin & Johnson in Cape Town, S. Africa. The vessel is a prototype of 6 freezer trawlers: 3 will be built in Aberdeen, the others in Africa.

UNITED KINGDOM (Contd.):

Advanced Design

The vessel's advanced design includes a "bunker" to receive freshly caught fish to be cooled by salt water, and 12 conveyer belts to carry the fish to sorting stations and directly to the packing stations.

The vessel is 61 meters l.o.a. long, 12 meters wide, and speed 14½ knots. The fish "bunker" is 18,000 cubic feet. (Reg. Fish Att., U.S. Embassy, Copenhagen, May 20.)

PORTUGAL

CANNED-FISH INDUSTRY OUTLOOK IS GLOOMY

Portugal's 1969 fish-canning season was unfavorable: there was a drop in fish landings at much higher exvessel prices than in 1968, an unfavorable year. The outlook this season is gloomy.

The mainstay is sardines. In 1967, landings along coast were 113,000 metric tons; in 1968, they dropped to about 78,000 tons; in 1969, to a little over 61,000 tons. Deliveries to canneries, always competing with demand for fresh sardines, decreased at same rate; prices rose. In 1969, landings were almost 17,000 tons below 1968.

Adverse Factors

These factors adversely affected the industry: decline of nearly 8,000 tons in pack, shift to packs other than canned sardines to make up for shortage of sardine packs, drop of about 13,000 tons in exports, loss or decline of some traditional export markets.

This Season's Prospects

The year began with temporary lifting of closed fishing season and duty-free import of fish and other seafood for canning. This season's fishing began April 1. Its effect on canned fish pack appears more promising. In Feb. and March, trawlers took advantage of suspension of closed season and caught reasonable quantities of sardine. In last days of March, sardine abundance was reported. If this prevails through 1970, the canned fish industry might face a better future. It would be able to resume contracts cancelled last year because of fish shortage. The early season was definitely encouraging, but the future, even short term, is unknown. ('Conservas de Peixe', Apr. 1970.)

USSR

FIRST AUTOMATED FISH HATCHERY SLATED FOR 1971

The Soviets are building an automated fish hatchery at Konakovskaia regional electric power station (Moscow region) that will be operational in early 1971. It will produce 400 metric tons of fish a year. This was reported by 'Izvestiia'.

Carp and trout will be fed by warm water from the power station. All operations will be automated, including catching fish of the right size and weight with special automatic device.

Small Staff

"Few" people will staff the hatchery, though staff size has not been specified.

This will be the first automated fish hatchery in the USSR.

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SOVIET-NORTH KOREAN FISHERY RELATIONS

The "Protocol of the First Session of the joint Soviet-North Korean Fisheries Commission" was signed in Pyongyang on Mar. 10, 1970, reported TASS, the Soviet news agency, on that day. Soviet-North Korean cooperation in 1970-71 was discussed and "regulations" adopted.

Prepared in 1969

The groundwork for the Joint Commission was laid in Moscow in June 1969. Scientific and technical cooperation, including fisheries, was discussed. Apparently, the Soviets have had an agreement with North Korea since 1967. In 1967, the Soviet Minister of Fisheries went to Pyongyang for fishery negotiations after Communist China abrogated the

USSR (Contd.):

Northwest Pacific Fisheries Commission in 1964.

50 N. Korean Trainees

About 50 North Korean fishery trainees were in Vladivostok in 1968, and possibly in 1969; some, accompanied by Soviet instructors, went to the North Pacific aboard Soviet large stern factory trawlers.

Oceanographic Cooperation Rejected

In March-April 1970, the Soviet research vessel 'Vitiaz' cruised the Sea of Japan to study seabed sediments, detect manganese modules, iron, and other metals, perform seismic investigations, and test new oceanographic instruments.

On March 11, 'Pravda' had announced cruise as a joint effort of Soviet, Japanese, and North Korean scientists. However, at the last minute, the North Koreans refused to go along. They said their research group "had not been consulted" on oceanographic research with Japanese scholars. They added: "inclusion of the Japanese is contrary to the terms of the Soviet-North Korean Technical and Scientific Cooperation Agreement."

A group of North Korean oceanographers who were in the USSR at the time may have accepted the invitation to join--but the government vetoed it.

ROMANIA

ORGANIZES MARINE RESEARCH INSTITUTE

Romania has organized a Marine Research Institute in Constanta on the Black Sea--her first. It will include hydrography, physical and chemical oceanography, marine fisheries, pisciculture, marine and coastal biology, marine geology, and marine pollution. The Institute will cooperate with other marine-research agencies to assess research results and plan exploitation of the seas.

The Institute probably will coordinate all fishery research, including that for ICNAF.

Institute's Predecessor Agency

The new Institute may have developed from the Marine Fishery Research and Planning Station at Constanta, administered since 1961 by the Joint Scientific Council for the Coordination of Romanian Research in the Black Sea. The Council studies marine fish, culture of commercial species, plankton, and physics of the Black Sea.

The Station's Activities

In 1961, the Station had a small research vessel--the 'Marea Neagra,' displacement 100 tons, crew of 7. She was equipped with echo-sounder, bottom drag, bottom corer, bathometer, and fishing gear (seines, trawls, etc.).

The Station investigated phytoplankton distribution in cooperation with the Romanian Navy's Hydrographic Office, studied the ecology of Romania's rocky shores with Agigea Marine Station, and was involved in fishery forecasting with other Romanian fishery laboratories. It also used divers to study quantitative changes in benthos.

LATIN AMERICA

PERU

STATE COMPANY FOR MARKETING FISH MEAL & OIL IS OPERATIONAL

On May 25, Peru's State company, EPCHAP, undertook the marketing of all Peruvian fish meal and oil. EPCHAP is Empresa Pública de Comercialización de Harina de Pescado. According to its executive director, General R.D. Chumbianca, the objective is to eliminate speculation and middlemen, and to establish a stable price for fish meal. He hopes EPCHAP will cause a minimum of changes in the marketing system.

Current Situation

Gen. Dianderas emphasized that all contracts made by private companies (390,000 metric tons) will be filled. When EPCHAP took control of selling fish meal, stocks were 640,000 tons.

Despite current closed anchovy fishing season, these limited stocks will increase slightly for 2 reasons: some small plants that had not fulfilled their quotas during season have been allowed an additional 300,000 tons during closed season; also, the ports of Ilo and Mollendo are excluded from seasonal prohibition on fishing.

Speculation & Stable Prices

Gen. Dianderas said that, historically, extreme price changes in fish-meal market have been caused largely by speculation. He hopes to maintain a more stable price that will reflect "normal" supply and demand. Because demand for fish meal is growing steadily, while supply is static, there will be pressure to raise price.

He said, however, that fish meal was only a small part of protein market; attempts to maintain high price artificially through stockpiling would only drive meal users to substitutes.

Price will be kept at present level (US$200/metric ton c. & f. Europe) for time being--but no guide to price changes has been set.

Averaging Prices

Fish meal plant will hold products until shipment, and be paid for meal when sold. EPCHAP will withhold a still-to-be-determined percentage to (1) pay marketing costs, and (2) allow room for averaging prices at year end. In December, all prices will be averaged and firms paid net amount owed them by EPCHAP.

To guard against speculations, Gen. Dianderas said Peru's Commercial Attachés will check those who have received fish meal to see whether they actually use it (end users).

Large marketing firms already have agreed to supply EPCHAP with list of customers. He believes Socialist countries will steadily demand more fish meal in proportion to their growing consumption of poultry--but there will be no dramatic rise in consumption.

Wait-and-See Attitude

Local producers, Peruvian and U.S., have a "wait-and-see" attitude toward EPCHAP. Luis Banchero Rossi, president of National Fisheries Society and leading industry figure, favors government control. He said: "It will benefit the country if it is efficient."

Industry is interested most in the operation's efficiency. (U.S. Embassy, Lima, June 10.)

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RECORD FISH-MEAL OUTPUT & HIGHER EXPORTS IN 1ST QUARTER 1970

In Jan.-Mar. 1970, Peru produced a record quarterly fish-meal output of 755,000 metric tons; this compared with only 583,000 tons for same quarter 1969. It exceeds 734,000-ton record of Oct.-Dec. 1967 and is 39% over previous quarter. The increase occurred despite a 4-week closed season in second-half February and first-half March.

Exports Up

Fish-meal exports in 3 months ending Mar. 31, 1970, were 611,600 tons, compared with 514,400 tons for same period 1969--and only 385,600 tons in Oct.-Dec. 1968.

Of total exports, 71% went to Europe, 18% to Western Hemisphere, and 11% to Asia. Exports to non-Western Hemisphere countries are about 82% of total, as in 1969. This is considerably above 67% of 1968, when U.S.

PERU (Contd.):

was the major single market. The chief factor in reduction of U.S. imports is relatively high price ratio of fish meal to soybean meal.

New Fishery Ministry

Peru established a Ministry of Fisheries on Feb. 1, 1970. Objectives are to regulate exports, study marine resources, and develop framework for edible fish industry--ports, ships, and refrigeration.

Prices continue relatively high despite improved catch. This may reflect uncertainty surrounding forward sales for export beyond government's arbitrary cutoff date of Sept. 30. On March 31, stocks of 440,000 tons, nearly equal to 450,000 tons of previous year, were substantially below large stocks of 1967 and 1968.

Anchovy Fishing Season Ends

Fishing since March 31 has been good. The anchovy fishing season was closed in mid-May; stocks probably exceeded 1969's reduced volume. At present rate of market uptake, supplies will dwindle sharply before beginning of 1970/71 fishing season in September.

Note: Earthquake damage early in June destroyed some stocks on hand and damaged plants. Amount of damage has not yet been reported.

URUGUAY

FISHING CONTRACT
AWARDED TO SPANISH FIRM

Uruguay's fledgling fishing industry took an important step with award of contracts on May 8 for building and equipping a US$2.6-million fishing terminal. Action was taken by state-owned SOYP, which will operate terminal. Late 1971 is target date for completion of work.

Contract Won

Spain's Camer International's bid of US$1,448,000 won the machinery and installation contract. This beat rival offer of a Pennsylvania firm by about $400,000. In addition to refrigeration and related machinery, the Spanish firm will furnish 8 refrigerator trucks and 50 delivery vehicles at $480,000 more.

The Uruguayan company Tieger & Braselli received contract for civil works with bid of $680,000.

Sought Since 1914

Need for an adequate receiving and storage terminal for fish, sought since 1914, has become more pressing as a result of new regulations. These facilitate transfer of fish in Port of Montevideo from foreign fleets to foreign transport vessels, an arrangement that American, Chinese, and others now use.

Urgency for the new center also arises from recent legislation offering broad incentives to foreigners investing in fishing and fish processing within Uruguayan territory.

Local meat-packing plants are now serving as temporary storage until terminal is completed. (U.S. Embassy, Madrid, May 21.)

FRENCH GUIANA

FINES U.S. SHRIMP TRAWLERS
FOR CUSTOMS VIOLATIONS

On June 5, the French customs office in Korou, French Guiana, took six U.S. flag shrimp trawlers into custody for violating French customs regulations. The vessels, owned by a firm in Georgetown, Guyana, and one in Cocoma, St. Laurent, French Guiana, were fined $800 (whether collectively or individually is not clear). The vessels apparently were bartering or otherwise trading supplies while in port. This is prohibited under French law without prior approval.

Advice to U.S. Trawlers

U.S. trawler owners should warn their captains against these practices inside 3 miles of French Guiana's territorial waters. (U.S. Consulate, Martinique, June 5.)

ASIA

JAPAN

FISHERY PRODUCTION DROP IN 1969 WAS FIRST IN 5 YEARS

Japan's 1969 fishery output was 8,610,000 metric tons, a slight drop from 8,670,000 tons, reports the Fisheries Agency.

It was the first drop since 1964 (including fish culture) from the preceding year.

Coastal Fishing Fell

Conspicuous in 1969 were declines in inshore (coastal) hauls and fish-culture yields to a 10-year low of 1,700,000 tons. The poor showing is expected to arouse demands for greater efforts to develop coastal fishing and pisciculture, these had rallied from 1,780,000 tons in 1964 to more than 2 million tons by 1968. Oyster production was among the notable losers.

Pelagic Fishing Much Responsible

Pelagic fishing hauls of 3,150,000 tons were much responsible for the decline because their annual gain was slowed to only 11% above 1968. They had been rising over 20% a year.

Deep-Sea Catches

All deep-sea fishery catches leveled off, except North Pacific trawling. The latter produced 369,000 tons--a 91% increase over 1968, chiefly in Alaska pollock. But fishery experts are not optimistic about prospects of Alaska pollock fishing because there are growing foreign conservationist moves to restrict catches.

Notable Offshore Declines

Among offshore catches, notable drops were in species in strong demand: saury pike (Pacific saury) 60% drop to 50,000 tons, cuttlefish 28% to 465,000, and tuna 7% to 383,000 tons. ('Japanese Economic Journal,' May 19.)

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FISHERIES AGENCY PLANS LARGE DEVELOPMENT OF SKIPJACK TUNA

The Japanese Fisheries Agency plans to develop the skipjack tuna resource in line with its ocean development program. More marine fish are being used for animal protein--particularly medium- and high-priced fish. These are being subjected to heavy fishing pressure with indications of overfishing.

So the agency is turning its attention to the widely distributed, underexploited and underutilized skipjack resource. The agency has formed a group of industry members and government researchers to study production, distribution, sales, and even bait problems of skipjack fishing.

Group's First Meeting

The group's first meeting was held May 14 to study the plan worked out mainly by the agency. The agency hopes Japan's skipjack production can be doubled or tripled above present 200,000 metric tons a year.

Gear & Areas

The pole-and-line gear is considered more suitable than purse seine. The region off New Guinea and West Irian is believed suitable for development. A combination of poling and seining reportedly has been suggested whereby skipjack chummed by a bait boat would be surrounded by a purse seiner.

No Full-Scale Operations

Several exploratory skipjack cruises have been made to the southwestern Pacific, but none resulted in full-scale commercial operations. The joint Japanese-Australian Kyokuyo-Gollin Fishing Co. is skipjack fishing off West Irian with good results; it is averaging five tons of catch per day of operation. ('Shin Suisan Shumbun Sokuho,' May 15, 'Suisan Keizai Shimbun,' Apr. 29.)

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BRISTOL BAY CRAB OPERATIONS REPORTED GOOD

The 1970 Japanese Bristol Bay crab fishing operations are producing good catches. Fishing was begun in February by the factoryship fleets led by 'Koyo Maru' and 'Keiko Maru'.

As of May 15, tanner crab catches by the two fleets were: 1,314 metric tons by Koyo Maru, and 1,815 tons by Keiko Maru, total of 3,129 tons. King crab production totaled 8,567 cases by Koyo Maru, and 5,785 cases by Keiko Maru.

JAPAN (Contd.):

Crab Resources Good

Favorable crab resources promise good season, particularly for tanner crabs. These are reported generally larger and more abundant than in 1969.

The factoryships are paying more attention to improving appearance and quality of frozen tanner crabs. There is a steady market for these in Japan to supplement king-crab production. Japan has been facing yearly king-crab cuts in negotiations with the U.S. and the U.S.S.R.

Prices Up

As of mid-May, Japanese domestic prices for frozen tanner crabs were US$889-916 a metric ton, compared with $694-833 in 1969. Prices are likely to continue steady because Japanese tanner crab quotas in western Bering Sea and Sakhalin Island were reduced in this year's meeting with the U.S.S.R.

Export prices for canned crabs have not yet been set. However, due to rising production costs, fishing restrictions and production cuts, Japanese packers will have to raise prices substantially above 1969.

Planned Exports

In 1970, the Japanese plan to export 150,000 cases of canned tanner crabs (180,000 cases in 1969), and an estimated 100,000 cases of canned king crabs (140,000 in 1969), although production outlook remains uncertain.

Sales to the U.S. and France are 60-70% of exports. ('Suisan Keizai Shimbun,' May 22.)

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INDIAN OCEAN TUNA FISHERY UNDER WAY

In early April, about 30 South Korean, 20 Taiwanese, and 5-10 Japanese and Okinawan tuna longliners were fishing in the Indian Ocean off eastern Africa year round under contract to Japanese trading firm Toshoku.

Primarily, they were catching albacore off Madagascar, Cape Town, and Durban, where the season runs until about August, and yellowfin off Mombasa and Colombo, Ceylon. Albacore catches were averaging 2-3 tons a day per vessel.

Daien Reizo Venture

Toshoku, with Daien Reizo Cold Storage Co., operates five to six 7,800-8,000 gross-ton refrigerated carriers in that region. In recent years, the firm has been handling an average of 2,000 tons of Indian Ocean-caught tuna a year; this year, it anticipates a 25,000-ton catch.

April Prices

About 70% of tuna caught off east coast of Africa and Malagasy are exported to the U.S. and Italy through Toshoku. In early April, albacore were being exported to the U.S. at $680 a short ton, presumably c. and f. U.S. west coast price; yellowfin were bringing $640 a metric ton (presumably c.i.f. price) in Italy. ('Minato Shimbun,' Apr. 7.)

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SALMON MOTHERSHIP FLEETS DEPART FOR NORTH PACIFIC

On May 15, 11 Japanese salmon motherships accompanied by 369 catcher vessels left Hokkaido for the North Pacific. The fleets headed straight for eastern sector of Area A (north of 45° N. latitude). They are seeking red salmon near Attu, Aleutian Islands. They began fishing around May 23.

Based on earlier sightings of Bristol Bay reds south of Aleutians by Fishery Agency's survey vessel, the fleets hope to meet a good run.

Good Fishing Forecast

The Kushiro Fishery Experimental Station in Hokkaido forecasts good fishing for reds and chums this year, particularly reds. The reds have been found distributed abundantly (4 fish to a "tan") in cold-water zone between 168° E.-170° E. longitudes.

The outlook for Asian pinks is not promising because 1970 is a poor cycle year. Oceanographic conditions indicate that the 1970 high-seas salmon fishery will be centered east of 160° E. longitude. ('Nihon Suisan Shimbun', May 18, 'Minato Shimbun', May 16.)

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JAPAN (Contd.):

NORTH PACIFIC WHALING FLEETS SAIL

Three Japanese whaling fleets were scheduled to depart in early May for the 1970 North Pacific whaling season. They have been assigned a catch quota of 798.16 blue-whale units (BWUs) and 2,700 sperm whales, a 10% reduction from previous season. Planned production of processed products totals 75,000 metric tons of oil, frozen or salted meat, meal, and other products. ('Minato Shimbun,' Apr. 21.)

Name of Mothership	No. Catcher Vessels	Quotas Baleen No. Whales	Quotas Sperm (BWUs)	Scheduled Departure and Return
'Nisshin Maru No. 3'	9	257	900	May 10-Aug. 27, 1970
'Tonan Maru No. 2'	9	257	900	May 8-Sept. 2
'Kyokuyo Maru No. 2'	8	284.16	900	May 2-Aug. 17

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VESSELS DEPART FOR EASTERN PACIFIC TO EXPLORE SAURY

On April 22, Japan National Association of Saury Fishery decided to send two vessels on an exploratory cruise to eastern Pacific.

Names of vessels and departure dates are: 'Akebono Maru No. 17' (499-gross-ton trawler, 36 crew) June 16, and 'Habomai Maru No. 21' (299 gross-ton tuna vessel, 29 crew) June 30.

Time & Place

Areas of operation and period of survey are: (1) undeveloped areas near 165° E. long.--two months; and (2) east of 175° E. long. south of Aleutian Islands, Gulf of Alaska, and off west coast of North America--four months. Vessels may also survey northwestern Pacific.

50% Government Subsidized

The survey is subsidized 50% by government. Two government biologists, one assigned to each vessel, are accompanying the expedition.

Interest in Eastern Pacific

Many fishery firms are interested in sending vessels to eastern Pacific; in 1969, several Japanese trawlers made good saury catches off U.S. west coast. The Fisheries Agency has received inquiries from firms wishing to send around 40 vessels to eastern Pacific. About 20 vessels will be licensed this year.

Licensing Conditions

Licensing conditions established for 1970 are: (1) Area of operation--North Pacific Ocean east of 165° E. long., (2) Minimum number of licensed vessels necessary to carry out high-seas saury exploration plan. (Effect operations have on market price for saury taken by coastal fishery will be considered); (3) Catches will not be sold until three days after coastal saury fishing season opens for vessels over 40 gross tons. ('Nihon Suisan Shimbun,' Apr. 29; 'Minato Shimbun,' Apr. 28.)

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SAURY VESSELS PLAN TO FISH NORTHEASTERN PACIFIC

Eight major Japanese fishery firms plan to operate about 20 saury vessels off west coast of North America in 1970. Three already have filed license applications with Fishery Agency.

The gear are "boke-ami" (stick-held dip nets), drift nets, and drag nets.

New Gear

One firm, Nihon Suisan, plans to use a new method (patent-pending) with a net described as a floating drag net. Details of its construction are unknown, but the gear is designed to fish even in stormy weather. ('Suisan Tsushin,' May 19.)

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JAPAN (Contd.):

BOTTOMFISH CATCHES IN BERING SEA & GULF OF ALASKA ROSE IN 1969

The Japanese Fisheries Agency has reported that bottomfish catches by 12 mothership fleets in the Bering Sea and Gulf of Alaska during 1969 were 854,641.3 metric tons; 35 independent trawlers caught 360,506.4 metric tons. ('Suisan Tsushin,' March 28 & 30.)

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RAISES 1970 HERRING IMPORT QUOTA FROM U.S. & CANADA

The Japanese Fisheries Agency has increased the 1970 herring import quota for the U.S. and Canada from 1,000 to 3,000 short tons. This is the first year Canada is included with the U.S. Alaska herring is preferred.

The quota from the U.S.S.R. remains 7,000 metric tons. (U.S. Embassy, Tokyo, May 28.)

* * *

WILL BUY MORE CUBAN SHRIMP

The Japanese Taiyo Fishing Co., in its second year of buying shrimp from Cuba, plans to increase purchases to 3,000 metric tons in 1970. In 1969, Taiyo contracted to import around 2,000 tons of shrimp and other species from Cuba.

The small Cuban shrimp consist of about 80% taken off the Guianas, and 20% in Gulf of Mexico.

Understanding With Cuba

Taiyo's purchases are based on agreement that the Japanese would provide materials and equipment worth US$8 million to help promote Cuba's fishing industry. Taiyo has drawn up a huge equipment export plan. It also is considering building a cold-storage plant in Cuba. ('Minato Shimbun,' May 20.)

* * *

CANNED TUNA EXPORTS ROSE IN 1969

Japanese canned tuna exports during business year 1969 (April 1969-March 1970) were about 6.68 million standard cases (7-oz. 48's). This was an increase almost 25% over 1968 exports, reports the Japan Tuna Packers Association. The increase was attributed primarily to the sharp gain in exports of canned tuna packed in oil. ('Suisan Tsushin,' May 21.)

* * *

MECHANICAL SKIPJACK TUNA POLE-AND-LINE GEAR TESTED

In mid-March 1970, Japanese mechanical pole-and-line skipjack tuna fishing gear, developed by Suzuki Tekkosho, was tested in southwest Pacific with impressive results.

The gear, aboard skipjack vessel 'Yusho Maru' (194 gross tons), accomplished three times the work of fishermen. It caught 160-200 skipjack per day of fishing. It worked particularly well in catching large (13-18 pound) fish.

Full Automation Sought

A specially designed, ship-rolling-control device prevented hooks from rising above the water and line from becoming entangled. The manufacturer hopes eventually to achieve a fully automated fishing operation by mechanizing bait chumming. The gear will be tested again off Japan during summer and winter skipjack and albacore seasons. ('Katsuo-maguro Tsushim,' Apr. 22.)

* * *

LARGE STERN TRAWLER TO BE BUILT FOR NORTHWEST ATLANTIC FISHERY

In 1971, the Japanese fishery firm Nihon Suisan plans to build a 4,000-gross-ton stern trawler to fish in the northwest Atlantic Ocean. The vessel, to cost about US$4.17 million, will be equipped to process high-priced fish. It will not process "surimi" (minced meat used as ingredient for edible fish cakes).

Optimum Vessel Size

Use of such a large vessel in the northwest Atlantic, where smaller trawlers diverted from eastern Atlantic during off-season in west African trawl fishery have been operating, is certain to raise question in fishery circles as to optimum vessel size for that region. ('Shin Suisan Shimbun Sokuho,' May 2.)

* * *

JAPAN (Contd.):

FISHERIES AGENCY HAS NEW RESEARCH VESSEL

A 494-gross-ton research vessel has been completed for Japanese Fisheries Agency assigned to the Tokai Regional Fisheries Research Laboratory. The vessel, 'So-o Maru,' will conduct resource surveys primarily in the North Atlantic.

Geared for trawling and other fishing, she also is equipped to conduct oceanographic observations.

Main Specifications

Main specifications are: length 46 meters (150.9 feet), width 9.3 meters (30.5 feet), depth 4.5 meters (14.8 feet), maximum speed 14.3 knots, main propulsion two 800-hp. diesel engines. ('Nihon Suisan Shimbun,' Apr. 24.)

* * *

GUYANA-BASED SHRIMP FLEET TO BE DOUBLED

The 35-vessel Japanese shrimp-trawler fleet based at Georgetown, Guyana, will be increased to 80. The vessels are operated by the Japanese South America Northern Coast Trawl Fishery Development Co. The firm is scheduled to participate in a joint processing venture with British-owned Guyana Industry Holdings (G.I.H.) of Georgetown.

Other G.I.H.-contracted vessels reportedly planned to be increased in number are (figures in parens are present fleet size): U.S.-registered 45 (32), British-registered 14 (16), local Guyana-registered 20 (5).

Building Plans

Plant construction for joint venture was scheduled originally to start in June this year. However, construction was delayed several months due to proposed increase in capital investment. This was set originally at US$3 million; the Japanese were to put up $1 million.

Earlier reports indicated that a 1,000-ton cold storage with a 100-ton freezing capacity, and an ice plant with output of 34,500 tons a year, would be completed within one year. However, G.I.H. may build a 3,000-ton cold storage.

71 Trawlers in June

In early June, the Japanese shrimp fleet off the Guianas was 71 trawlers: 10 licensed for regular commercial fishing, and 61 to fish experimentally (1-year permit). ('Suisan Keizai Shimbun,' June 2.)

* * *

POLLOCK FISHING IN EASTERN BERING SEA IS POOR

Japanese trawler fishing in early June for Alaska pollock in eastern Bering Sea north of Unimak Island was poor. Six trawl fleets were fishing, led by factoryships 'Mineshima Maru' (21,000 gross tons), 'Gyokuei Maru' (10,357) 'Shikishima Maru' (10,144) 'Nisshin Maru No. 2' (27,035) 'Soyo Maru' (11,192) and 'Hoyo Maru' (14,111), plus 9 large independent stern trawlers.

Pollock Catches Halved

Since mid-May, their pollock catches have declined to half those of March-April. Also, the spawned-out fish are running smaller. They average 0.81-0.84 pound each, compared with 1.1-1.2 pounds in Feb.-April.

The fleets are encountering the same slackening of fishery they experienced last year about this time. It seems this condition is becoming a regular occurrence.

Some independent trawlers had moved temporarily to southern side of Aleutians in search of better fishing. They could make no catch, so they returned to eastern Bering Sea. ('Suisan Tsushin,' June 2.)

* * *

10,000-TON HERRING IMPORT QUOTA SET FOR 1970

On May 11, 1970, the Japanese Ministry of International Trade and Industry disclosed a 10,000-ton herring import quota for fiscal 1970 (April 1970-March 1971). This is a 25% increase over 1969's 8,000 tons.

In 1969, 6,787 tons were purchased from the Soviet Union, and 1,046 tons from Alaska.

JAPAN (Contd.):

The quota was increased because Canada has been added to supplying countries in 1970. The import allocation will be given to the Hokkaido Federation of Fisheries Cooperative Associations.

Prices Negotiated

Price negotiations for purchase of Soviet herring were concluded on May 7. The Japanese agreed to pay for 1970 deliveries at sea per metric ton: fresh US$143, salted $154, f.a.s. (free alongside ship) Okhotsk Sea; frozen $262, c. and f. Otaru or Wakkanai, Hokkaido.

Compared with 1969, prices are 14% higher for fresh fish, and about 20% for frozen fish. No salted herring was imported from the Soviet Union in 1969. ('Suisancho Nippo,' May 11 & 12.)

* * *

NEGOTIATES WITH S. KOREA TO IMPORT CANNED MACKEREL

A Japanese trading firm is negotiating to import canned mackerel from the South Korean Fisheries Public Corp. The Korean corporation reportedly is asking $7 a case (1-lb. talls, 48's). If a deal materializes, S. Korean packers can be expected to increase production of canned mackerel for export to Japan, which would become an important market.

Several years ago, S. Korea exported US$12,000 worth of canned mackerel to New Guinea, but the unprofitable trade was discontinued.

In Japan, imports of fresh, frozen, live, smoked, or dried mackerel are under quota restrictions--but canned is unrestricted. ('Nihon Suisan Shimbun,' May 29.)

* * *

BRISTOL BAY RED SALMON CATCH IN NORTH PACIFIC REPORTED GOOD

Eleven Japanese salmon mothership fleets fishing in the North Pacific reported good red salmon catches from around May 24-25 because the run of Bristol Bay reds was heavy, as predicted. In early June, they were fishing near the eastern boundary of Area A (north of 45° N. lat.), south of the Aleutian Islands.

The salmon were about 80% reds and 20% chums. Contrary to expectations, red salmon are small, about 3.9 pounds a fish. These compared with 4.6-4.8 pounds during previous good run of Bristol Bay reds in 1965. The chums, on the other hand, are averaging 4.8 pounds a fish.

Heavy Red-Salmon Run

Fishing in area south of Aleutians continues good until around June. The schools then begin migrating northward. The fleets either start moving toward north side of Aleutians, or proceed westward. The 1970 Bristol Bay red salmon run is the heaviest in recent years. And, as predicted, the reds are likely to make up a high percentage of Japanese high-seas salmon catch this year.

Situation in May

In Area B (south of 45° N. lat.), the fishing situation in late May was described by Kushiro Fisheries Experimental Station in Hokkaido: Most gill-net vessels that concentrated on reds east of 170° E. long. until mid-May returned home; in late May, no vessels were fishing in that area. In late May, concentrations of reds in Area B were becoming lighter; catch per "tan" was 1-2 fish. However, northward migration of reds is slower than usual this year. Pinks are distributed widely. Considering that 1970 is a poor cycle year for pinks, they are present in fairly heavy quantities. ('Suisan Tsushin,' June 1 & 9.)

PHILIPPINES

FISH FARMING AIDED

For 7 months of the year, the Candaba area of the Philippines is flooded by seasonal rains that turn it into a huge marshland. It yields only one crop during the dry season: melons.

During their sweep along the lowlands, the floods, which reach 20 feet in places, carry millions of fish. These are trapped by farmers before waters recede. But the introduction of modern fish-culture and fingerling-rearing methods could greatly increase harvests and incomes.

Two FAO fishery biologists have carried out a pilot project to harness the flood waters to produce fish.

Work of FAO Biologists

The biologists have used fingerlings of various carp species imported from Taiwan in combination with local species. They have shown that marshlands can be farmed scientifically to produce unprecedented amounts of fish. They designed and built new ponds and supporting facilities in the Candaba area, including hatcheries to produce fingerlings for stocking the ponds. They trained extension workers and pond managers.

Government Plans

The Government plans, with FAO assistance, to develop almost 3,000 hectares of lowland in Candaba area into fish ponds at 17 sites to produce Chinese carp and suitable local species. The two-year project seeks development of a 60-hectare hatchery to produce stock fingerlings on continuing basis.

The pilot demonstration project is part of a general floodland fish-farming expansion program. It was approved by Philippines National Food and Agriculture Council in Feb. 1969 as a priority food-production project. It has been supported by UN Development Program and Australian Freedom from Hunger Campaign. (FAO, May 29.)

HONG KONG

FISHERIES ARE DECLINING

In 1969, Hong Kong's fishing fleet totaled 6,188 vessels, a decline of 626 vessels from 1968, and 3,292 from 1967, according to the 1970 Hong Kong yearbook. All categories of fishing craft decreased.

The 1969 fishing population of 45,000 was down over 30,000 from the previous two years.

More Shore Jobs

The downward trend is attributed to increasing shore jobs to which young fishermen are attracted. This is particularly true since the wages of land-based jobs have increased sharply in recent years.

The livelihood of fishermen is improving, however, due to active support and technical assistance by the Agriculture and Fisheries Office. ('Shin Suisan Shimbun Sokuho', May 15.)

SOUTH KOREA

1970 DEEP-SEA FISHING PLANS OUTLINED

In 1970, S. Korea plans to earn US$26 million in foreign currencies by catching (and exporting) 90,000 metric tons of fish with 229 deep-sea vessels. By the end of 1969, her 224 vessels had caught 80,000 tons with export value of $24,070,000.

Deep-sea fisheries account for 34% of annual exports of fishery products.

Rapid Growth

The rapid growth of S. Korea's deep-sea fisheries is due to: (1) Government support to private industry to purchase vessels; (2) Government assistance with medium-term loans to expand fishing; and (3) training experts.

The planned 1970 catch increase is 12.5% and for exports 4.2%. The greater part of 1968 catch came from Pacific, but highest export earnings were from Atlantic fisheries.

S. KOREA (Contd.):

Catch Targets

The Office of Fisheries raised catch targets for all high-seas areas except the Atlantic, which were cut two-thirds. Decline is due to: shortage of shore bases for S. Korean fishing fleets and logistics problems, general decline of fishery stocks, and declining fish prices at African bases.

To meet 1970 targets, Office of Fisheries plans to add six 2,000-ton vessels and 12 other vessels (size not specified) to high-seas fleet. Tuna bait will be provided domestically.

Government-owned Korea Marine Development Corp. (KMIDC) is S. Korea's largest high-seas fishing firm: 31,800-ton catch in 1969 and $10 million worth of fishery-product exports. This is about 41% of 1969 high-seas catch and exports.

Problems

Deep-sea fisheries are faced with following problems: (1) obtaining fishing rights off coasts where fleets fish (especially, off U.S., Canada, and Japan); (2) getting management of KMIDC out of red; (3) obtaining funds to build new vessels replacing old ones; and (4) devising appropriate measures against growing competition from Republic of China (Taiwan), which "may eat away fishing grounds and markets unless proper steps are taken." ('Taehan Ilbo').

THAILAND

DEMERSAL FISH STOCKS IN GULF OF THAILAND FALL 50%

Demersal fish stocks in Gulf of Thailand decreased more than 50% during 1961-1967. Decline will continue due to expansion of otter trawling (encouraged by Department of Fisheries since 1961) and increase in trawlers. The demersal fish catch is a large percentage of total marine fisheries catch.

Catch rates of demersal fish have decreased over 50% from 1961-1967, according to Department of Fisheries. Research vessel data show decline from about 300 kg. per hour of trawling in 1961 to 115 kg. in 1967. Catch rate of commercial vessels declined from about 17 crates (weight unknown) per hour of trawling in 1962 to 8 crates in 1966.

Over Maximum Sustainable Yield?

The maximum sustainable yield (MSY) of demersal fish is estimated at about 500,000 metric tons (about 6 tons per square kilometer). Catches increased from about 123,000 tons in 1961 to about 450,000 tons in 1966, when they came close to MSY. In 1967, Thailand's demersal fish catch in Gulf of Thailand (525,000 tons) exceeded estimated MSY.

Limit Vessels

The Government must now protect demersal fish stocks. The Demersal Fish Conservation Unit recommended limiting trawlers of specific sizes rather than total of all trawlers. ('Thai Fisheries Gazette')

SOUTH PACIFIC

AUSTRALIA

ECONOMIC STUDY OF NORTHERN SHRIMP FISHERIES ANNOUNCED

Australia's Department of Primary Industry will undertake during 1970 an economic investigation of the shrimp fisheries of northern Queenland and the Northern Territory.

The officers will interview members of fishing and shrimp-processing companies, industries servicing shrimp operations, and owners and skippers of trawlers and their accountants.

Joint ventures and Australian-owned operation will be considered.

Data for Economic Analysis

Information collected will serve government and the fishing industry. As results of research into northern shrimp become available, more detailed economic analysis will be possible.

This will help formulate policy for this important industry, including rational exploitation of the shrimp resourced. ('Australian Fisheries', Mar. 1970.)

AMERICAN SAMOA

TUNA PRICES ROSE IN JUNE 1970

Japanese tuna suppliers and U.S. packers in American Samoa increased prices US$20 a ton for albacore and $10 a ton for yellowfin deliveries in June 1970.

The new prices per short ton: frozen round albacore $530, frozen gilled-and-gutted yellowfin $420.

The Japanese had asked a $20-a-ton increase for albacore and yellowfin. ('Katsuomaguro Tsushin,' June 9.)

AFRICA

SOUTH AFRICA

SPINY-LOBSTER-TAIL EXPORTS TO U.S. ARE LOWEST IN DECADE

In 1969, there was a dramatic drop of 34% in shipment of cold-water spiny lobster tails to U.S. by South Africa. For first 10 months of 1969, shipments sagged to lowest level since trade was first reported in separate statistics by U.S. 10 years ago.

Shipments Down

The South African fall-off forms the most significant component in a general decline in shipments of cold-water spiny lobster to the U.S. Total imports from Australia, New Zealand, and South Africa fell 20% over the same period.

South Africa's share of U.S. market tumbled from 32% in 1968 to 22% in 1969. Australia's share, with a contribution down 15% in quantity, fell from 32 to 27%.

Brazil Large Supplier

Brazil's warm-water spiny lobster has been a major factor in supplying U.S. gourmet consumers. Imports by U.S. soared in 1969 to 173% above 1968. Brazil now ranks third, 4.5 million pounds behind Australia's 8.2 million pounds and South Africa's 6.5 million pounds, among main suppliers.

In 1969, warm-water tails were 37% of all lobster tails reaching U.S., compared with 23% in 1968. Total shipments in 1969 reached 30 million pounds; in 1968, these were 30.4 million pounds.

Higher Prices Main Reason

Substantially higher prices probably have been main reason for sales drop of spiny lobster tails to 27 to 28 million pounds in first 10 months of 1969; this compared with 30.2 million pounds in same period of 1968.

With sales dropping and inventories mounting, wholesale prices inevitably slumped by mid-1969. In New York City, the drop was from US$3.75 for 6-8-oz. cold water tails in June to $2.70 in Oct. Warm-water tails dropped from $2.68 to $2.13. ('South African Shipping News and Fishing Industry Review', Feb. 1970.)

BCF'S BIOLOGICAL LABORATORY, HONOLULU, HAWAII

The Bureau of Commercial Fisheries Biological Laboratory, Honolulu (P.O. Box 3830, telephone 946-2181) is located adjacent to the University of Hawaii in Honolulu's historic Manoa Valley. Established by Act of Congress in 1947, and known as the Pacific Oceanic Fishery Investigations in its early years, it has a staff of about 90 persons, of whom about 18 are professional scientists. It operates two research vessels. The larger is the 'Townsend Cromwell', 158 feet long, named after the late oceanographer who, while on the Laboratory staff, discovered the easterly flowing equatorial current that bears his name. The other vessel is the 'Charles H. Gilbert', 123 feet long, named after a renowned fishery expert of the early 20th century. Among the facilities of the Laboratory is a special library in oceanography and fisheries that is one of the best in the Pacific.

A scientific facility unique to the Laboratory is a group of fish-holding tanks located at Kewalo Basin, Honolulu, where the research vessels dock, in which living tunas can be held for experiments on their behavior and physiology. A series of pioneering studies on tuna behavior has been made there, and the facility attracts visiting investigators from the mainland and abroad whose research specialties require, or could benefit from experiments with living tunas.

The energies of the Laboratory in Honolulu are now focused on the harvesting by Americans of the now relatively unutilized skipjack tuna of the central Pacific Ocean. The skipjack tuna (Katsuwonus pelamis) is the mainstay of the small Hawaiian live bait tuna industry. As a first step toward a larger central Pacific harvest, the Laboratory is attempting to assist the Hawaiian industry to increase its present catch.

Bureau of Commercial Fisheries Biological Laboratory, Honolulu, Hawaii.

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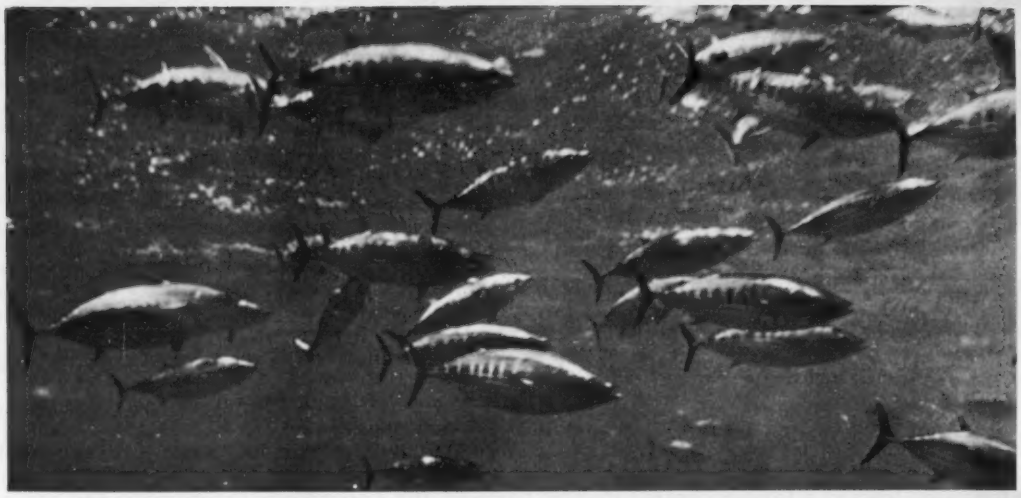

Skipjack tuna photographed from the 'Charles H. Gilbert.' During their feeding frenzy, a barred pattern appears on their flanks.

In pursuit of its aim of making the skipjack tuna resource available, the Laboratory is conducting basic studies in fishery biology, oceanography, and fish behavior. It is also pursuing investigations in applied science, attempting to better the operations of the Hawaiian tuna fleet by freeing it from its present dependence upon a small anchovy (Stolephorus purpureus), or nehu, as it is known locally, that is used for bait.

The Laboratory maintains cordial relations with the University of Hawaii--several of its scientists are members of the University's Affiliate Graduate Faculty. It also cooperates closely with the University's East-West Center, facilitating scientific interchange between America and Asia. It maintains ties with other research organizations in Hawaii, such as the Hawaii Division of Fish and Game and the Oceanic Institute.

Laboratory staff members represent the United States at meetings of such international bodies as the Indo-Pacific Fisheries Council, UNESCO's Cooperative Study of Kuroshio and Adjacent Regions, the International Indian Ocean Fishery Commission, and the South Pacific Commission.

One of the significant achievements of the Laboratory has been the use of immunogenetic techniques to show that the skipjack tuna of the Pacific Ocean can be separated into distinct groups. The results show one subpopulation in the western Pacific (Japan, Trust Territory), another in the eastern and central Pacific.

Another major achievement has been the preparation of an 'Oceanographic Atlas of the Pacific Ocean', a definitive volume, published by the University of Hawaii Press, in which half a century of oceanographic observations in the Pacific have been analyzed and presented in a form useful to oceanographers and fishery scientists.

The Laboratory welcomes visiting investigators and has been the site of original research by scientists from the mainland, Europe, and Asia. Space is limited, however, and arrangements with the Director must be made well in advance. (BCF Circular 306)

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